United States Department of Agriculture

Natural Resources Conservation Service

In cooperation with the University of Alaska Fairbanks Agricultural and Forestry Experiment Station, and Salcha-Big Delta Soil and Water Conservation District

Soil Survey of Gerstle River Area, Alaska

How To Use This Soil Survey

General Soil Map

The general soil map, which is a color map, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

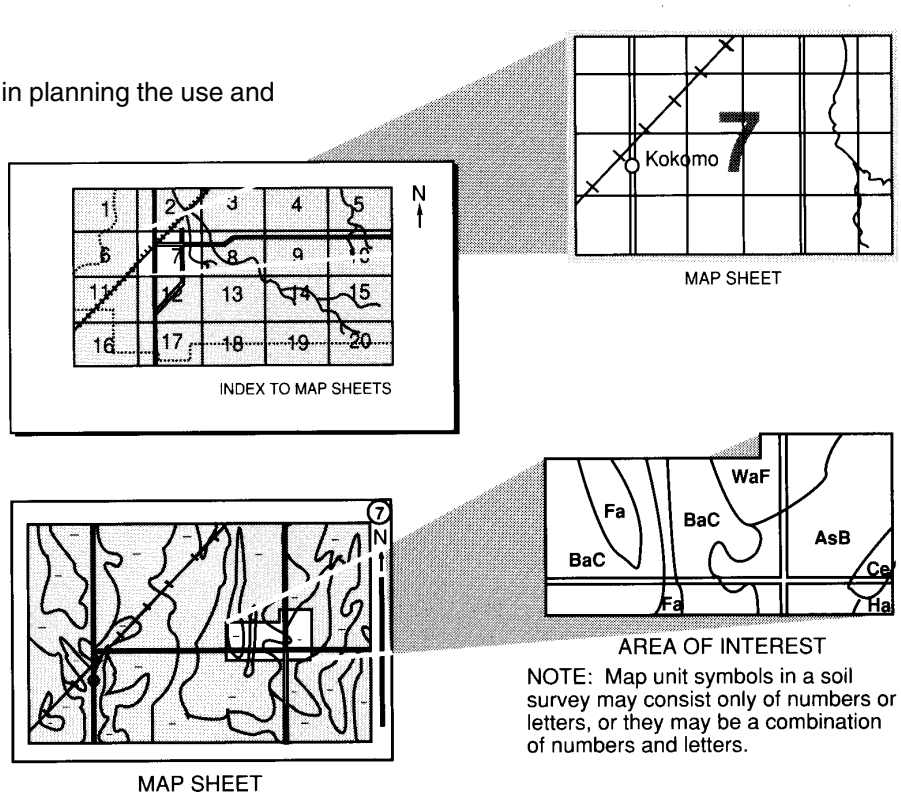
Detailed Soil Maps

The detailed soil maps can be useful in planning the use and management of small areas.

To find information about your area of interest, locate that area on the **Index to Map Sheets**. Note the number of the map sheet and turn to that sheet.

Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Turn to the **Contents**, which lists the map units by symbol and name and shows the page where each map unit is described.

The **Contents** shows which table has data on a specific land use for each detailed soil map unit. Also see the **Contents** for sections of this publication that may address your specific needs.



NOTE: Map unit symbols in a soil survey may consist only of numbers or letters, or they may be a combination of numbers and letters.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (formerly the Soil Conservation Service) has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1993. Soil names and descriptions were approved in 1995. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1995. This survey was made cooperatively by the Natural Resources Conservation Service and the University of Alaska Fairbanks, Agricultural and Forestry Experiment Station. It is part of the technical assistance furnished to the Salcha-Delta Soil and Water Conservation District.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

Cover: The Gerstle River is a braided river fed by glaciers in the Alaska Range, which is visible in the background.

Additional information about the Nation's natural resources is available on the Natural Resources Conservation Service home page on the World Wide Web. The address is http://www.nrcs.usda.gov (click on "Technical Resources").

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Issued 2001

Foreword

This soil survey contains information that can be used in land use planning in the Gerstle River Area. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

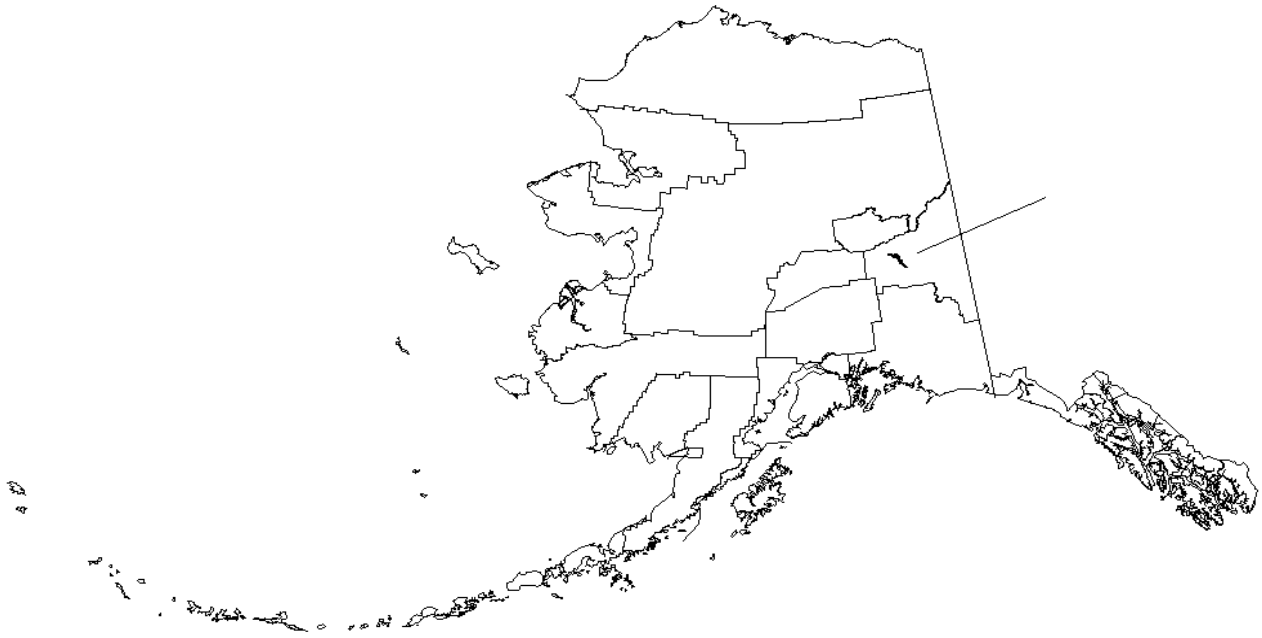
This soil survey is designed for many different users. Farmers, ranchers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, Alaska Native tribes, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock or have permafrost. Some are too unstable to be used as a foundation for buildings or roads. Wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

Help in using this publication and additional information are available at the local office of the Natural Resources Conservation Service, the Salcha-Big Delta Soil and Water Conservation District or the Alaska Cooperative Extension.

Natural resource conservation can be defined as the wise use of natural resources in order to sustain productivity. It is our desire that this soil survey will contribute to natural resource conservation in the State of Alaska.

Charles W. Bell
State Conservationist
Natural Resources Conservation Service



Location of Gerstle River Area in Alaska.

Soil Survey of
Gerstle River Area, Alaska

By David K. Swanson, Natural Resources Conservation Service

Fieldwork by David K. Swanson, Mark Clark, and Darrell Kautz, Natural Resources Conservation Service

United States Department of Agriculture, Natural Resources Conservation Service
in cooperation with
University of Alaska Fairbanks, Agricultural and Forestry Experiment Station

General Nature of the Survey Area

This section provides general information about the survey area. It describes physiography and geology, permafrost, native vegetation, history, agriculture, and climate.

Physiography and Geology

The survey area is part of the Tanana Lowland, a nearly flat flood plain located between the Alaska Range and the Yukon-Tanana Upland (Wahrhaftig, 1965). In this survey area, the plain slopes from about 1,600 feet (488 meters) above sea level near the Alaska Range to about 1,000 feet (305 meters) above sea level along the Tanana River. East of the Gerstle River, several bedrock hills rise above the plain to a maximum elevation of 1,960 feet (597 meters).

The Tanana River, a large, silt-laden river with a complex channel, bounds the survey area on the north and east. The Gerstle, Little Gerstle, and Johnson Rivers, braided rivers fed by glacial meltwater, flow from the Alaska Range across the survey area into the Tanana River. Other major streams include Dry Creek, which is fed by runoff from a nonglacial valley in the Alaska Range, and Clearwater River, which is fed mainly by groundwater and remains partly open throughout winter.

An extensive wetland area is on the plain, south of the Tanana River, in the western part of the survey area. Like the Clearwater River, this wetland area is fed by groundwater that infiltrates into the flood plain along the Alaska Range and flows northward through gravelly subsurface deposits (Nelson, 1978; Wilcox, 1980).

Geologic material in the survey area consists mainly of river deposits (Weber et al., 1977; Holmes and Péwé, 1965). These deposits are mostly sand and gravel with a mantle of fine sand and silt a few inches to many feet thick. In some wetland areas, the alluvium is covered by a layer of peat that is one foot to several feet thick.

Recent alluvium is on the flood plains of the Tanana, Gerstle, Little Gerstle, and Johnson Rivers and of Dry Creek. Most of the survey area consists of older alluvium that is now rarely flooded, if ever. In the southeastern part of the survey area, near the Alaska Highway, a distinct escarpment separates the older stream terraces from the active flood plains. In the rest of the survey area, the frequently flooded or occasionally flooded areas near the rivers gradually merge with the rarely flooded or nonflooded areas further from the rivers. Because of the flat topography, lack of distinct terraces, and abundance of braided rivers (which can abruptly change course), most of the survey area is in some danger of being flooded or even occupied by a river channel as a result of a change in the course of a river (USDA, 1978).

Glacial moraines are at the southeastern end of the survey area. These moraines were deposited by valley glaciers that flowed out of the Alaska Range through the Johnson River Valley during the Pleistocene. The freshness of the topography indicates that the moraines were deposited during the Donnelly Glaciation (Holmes and Foster, 1968). The moraines consist of coarse-grained gravel, cobbles,

and boulders in a matrix of loamy sand. Dunes of fine sand also are on the flood plain.

The bedrock hills consist of Cretaceous granite (Holmes and Foster, 1968). Near the surface, the granite commonly is highly fractured or has weathered to coarse sand.

The higher lying landforms, including the bedrock hills, glacial moraines, and sand dunes, are mantled by loess (wind-deposited silt). In the bedrock hills and moraines, a layer of wind-deposited fine sand underlies the silt. Most of the loess probably was eroded from broad, unvegetated flood plains of braided streams by wind. Loess from the flood plains of the Tanana, Gerstle, and Johnson Rivers continues to be deposited during periods of strong southerly winds. The deposition of alluvium has prevented the accumulation of a layer of pure loess on most of the flood plains.

Permafrost

Permafrost is discontinuous in the survey area (Ferrians, 1965). It is within 5 feet (1.5 meters) of the surface in areas of the flood plain where flooding is rare or nonexistent, the mantle of silt is more than 20 inches thick (50 centimeters), and the organic mat is more than 8 inches thick (20 centimeters). Permafrost also occurs within 5 feet (1.5 meters) of the surface on the north-facing slopes of the bedrock hills and in poorly drained depressions throughout the survey area. Permafrost may be at a greater depth elsewhere in the survey area, but it is probably absent altogether in the frequently flooded areas along streams and on the south-facing slopes of the bedrock hills (Péwé, 1954).

The depth to permafrost increases when the natural vegetation and the insulating mat of organic matter on the soil surface are removed by fire or are cleared (Péwé and Holmes, 1964). The lowering of the permafrost table after clearing usually results in improved soil drainage. Clearing is not likely to improve soil drainage in areas of ground water discharge nor in areas where the regional ground water table is near the surface, such as in the wetlands along the Tanana River, in the northwestern part of the survey area. Permafrost is absent in many of these wetland areas, probably because of the heat transported by the ground water.

Because large ice masses are not present in the gravelly substratum of the soils in the survey area, land clearing normally does not result in subsidence. In areas where the silty mantle overlying the sand and gravel is thick, however, some differential subsidence may occur as a result of melting buried ice.

Native Vegetation

The native vegetation in most of the survey area is boreal forest, which is similar to that of Interior Alaska. The survey area is included in the Northern Forest Formation, Eastern Interior Zone, in the publication "Examining Alaska's Forest Vegetation Zones" (Packee, 1994). The major forest types include white spruce, white spruce-paper birch, black spruce, and black spruce-quaking aspen. On the river flood plains, white spruce-balsam poplar and balsam poplar forest types are common. During the late 1970's and early 1980's, many acres of forest were cleared for agricultural development. Subsequently, many acres of the cleared land were abandoned and currently support dense shrubs and forest regeneration.

North of the Clearwater River, in the part of the survey area watered by the Clearwater aquifer, the vegetation consists of a variety of wetland shrub, herbaceous, and aquatic plant communities. Small stands of forest and understory vegetation are on the drier microsites and soils.

History

The survey area was first settled by American Indians at least 11,000 years ago (Aigner, 1986). Athabaskan Indians of the Tanacross language group still live in the villages of Healy Lake, across the Tanana River, and Dot Lake, 15 miles to the east. The Athabaskans have used the area for fishing, hunting, trapping, and collecting berries and other wild plants (Thorson, 1986; Kraus, 1982).

The fur trade in the 1800's and the discovery of gold near Fairbanks in the early 1900's brought Europeans to Interior Alaska. No roads or settlements were in the survey area until 1942, when the Alaska Highway was constructed across its southeastern border.

The nearest incorporated city is Delta Junction, about 25 miles west of the survey area. A sawmill, several farms, and a few homes are in the survey area.

Agriculture

A large-scale agricultural development in the Delta Junction area, the Delta Barley Project, began in 1978 with the sale of agricultural rights to 60,000 acres (24,000 hectares) of land in 22 parcels. Agricultural rights to 13,000 acres (5,300 hectares) in smaller parcels that average less than 200 acres (80 hectares) and are north and east of Delta Junction were sold between 1978 and 1981. Agricultural

development within the boundaries of the survey area, the Delta II East Project, began in 1982 with the sale of agricultural rights to an additional 24,000 acres (10,000 hectares) in 15 parcels. These agricultural projects were intended to develop large-scale barley production for export and for future local beef and dairy industries (McNicholas, 1983; Alaska Agricultural Action Council, 1982).

Most of the Delta II East Project area was cleared by the end of 1983. As of 1994, less than one-fourth of the project area was in crops because of a lack of markets, inadequate infrastructure, and the inability to compete with products grown outside of Alaska.

The major crops grown in the Delta Junction area are barley, potatoes, hay, and grass for seed. A variety of cold-tolerant vegetables are grown in gardens. There are also beef and dairy operations, and bison, elk, and reindeer ranching is developing.

Climate

The survey area has a continental subarctic climate with long, cold winters and short, warm summers. Climatic data for the survey area, shown in tables 1, 2, and 3, were recorded at Clearwater, Alaska, which is adjacent to the northwestern tip of the area. In summer (June through August) the temperature at Clearwater averages 55 degrees F (13 degrees C), and in winter (November through March) the temperature averages -1 degree F (-18 degrees C). The average annual temperature is 25 degrees F (-4 degrees C).

The length of the frost-free season varies considerably. Frosts (temperatures below 32 degrees F, or 0 degrees C) can occur in any month. The average annual growing-degree days (base temperature 40 degrees F, or 4 degrees C) during the frost-free season is only about 1,500 days, an amount considered marginal for commonly grown field crops (Allen, 1983). However, a variety of frost-tolerant crops can be grown.

The average annual precipitation at Clearwater is 15 inches (40 centimeters). Precipitation data recorded at other climatic stations in the survey area show lower totals—12 inches (31 centimeters) at Rhoades Creek and 13 inches (33 centimeters) at Granite Creek. July is the wettest month, and April is the driest. Moisture is generally adequate for crops adapted to the growing season; however, a lack of precipitation in spring often results in soil moisture deficits early in summer, which may retard crop emergence and development. Cool, wet weather late in summer may delay crop maturation and harvest.

Snow covers the ground continuously from mid-October or late October to late April or early May. Snow depth and water content data are recorded at the Gerstle River snow survey site, which is within the survey area. Late in winter (April 1) the snow depth averages 16 inches (41 centimeters), which is equivalent to 2.9 inches (7.4 centimeters) of water.

How This Survey Was Made

This survey provides information about the soils and miscellaneous areas in the survey area. The information includes a description of the soils and miscellaneous areas and their location and a discussion of their suitability, limitations, and management for specified uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the material in which the soil formed. This material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils and miscellaneous areas in the survey area are in an orderly pattern that is related to the geology, landforms, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind or segment of the landscape. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landscape, soil scientists develop a concept, or model, of how the soils were formed. Thus, during mapping, this model enables the soil scientists to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Individual soils on the landscape commonly merge into one another as their characteristics gradually change. To construct an accurate map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted color, texture, size, and shape of soil aggregates; kind and amount of rock fragments; distribution of plant roots; reaction; and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil

scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts and each has a set of soil characteristics with precisely defined limits. The classes serve as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas. This allowed the scientists to confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and engineering tests. Soil scientists interpret the data from these analyses and tests, as well as the field-observed characteristics and the soil properties, to determine the expected behavior of the soils under different uses. Interpretations for all soils are field tested by observing the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data is assembled from other sources, such as research information, production records, and field experience of specialists.

Predictions about soil behavior are based on soil properties and on such variables as climate and biological activity. Soil conditions are predictable over long periods, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years. They cannot, however, predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

This soil survey was mapped at two levels of detail. At the more detailed level, map units are narrowly defined. Map unit boundaries were plotted and verified at closely spaced intervals. At the less detailed level, map units are broadly defined. Boundaries were plotted and verified at wider intervals. The detail of mapping was selected to meet the anticipated long-term use of the survey, and the map units were designed to meet the needs for that use.

The descriptions, names, and delineations of the soils in this survey area do not fully agree with those of the soils in adjacent survey areas. Differences result from a better knowledge of soils, modifications in series concepts, or variations in the intensity of mapping or in the extent of the soils in the survey areas.

General Soil Map Units

The general soil map at the back of this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, it consists of one or more major soils or miscellaneous areas and some minor soils or miscellaneous areas. It is named for the major soils or miscellaneous areas. The soils or miscellaneous areas making up one unit can occur in another but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils or miscellaneous areas can be identified on the map. Likewise, areas that are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

The scientific names of the plants mentioned in the map unit descriptions are given in the Appendix.

Salchaket-Jarvis-Chena Association

Very shallow to deep, nearly level, well drained and excessively drained, silty and sandy soils underlain by sand and gravel; on flood plains

This map unit is on flood plains adjacent to streams. The soils formed in stratified river deposits. The major soils in this unit are subject to occasional or rare flooding. Elevation is 1,000 to 1,500 feet (305 to 457 meters). Slope is 0 to 3 percent.

This unit makes up about 20 percent of the survey area. It is about 30 percent Salchaket soils, 30 percent Jarvis soils, 15 percent Chena soils, and 25 percent soils of minor extent.

All three major soils consist of 1 to 6 inches (3 to 15 centimeters) of strata of silt, loam, sandy loam, and fine sand over sand and gravel. The Chena soils have less than 10 inches (25 centimeters) of stratified surface material over sand and gravel, the Jarvis soils have 10 to 40 inches (25 to 102 centimeters), and the Salchaket soils have more than 40 inches (102 centimeters).

The Jarvis, Salchaket, and Chena soils support forests of white spruce and balsam poplar. Shrub thickets of willow and alder and unvegetated sandbars are along the rivers. This unit is most suitable for forestry and wildlife habitat. The most productive white spruce forests in the survey area are on the Salchaket and Jarvis soils. Much of this unit is poorly suited to homesites or other buildings because of flooding. Most of the unit is poorly suited to agriculture because of flooding, steep channels, and areas that have shallow or sandy topsoil.

Liscum-Mosquito-Histosols Association

Shallow and moderately deep over permafrost and very deep and lacking permafrost, nearly level, very poorly drained, silty and peat soils; on flood plains

This map unit is on a poorly drained flood plain south of the Tanana River, in the northwestern part of the survey area. The high water table in this area is maintained by a discharge of ground water that infiltrates at the foot of the Alaska Range and flows northward through the gravelly sediment. Permafrost is spotty. The soils in this unit are rarely flooded by overbank flow from rivers, but ponding is common. Elevation is 1,000 to 1,100 feet (305 to 335 meters). Slope is 0 to 2 percent.

This unit makes up about 15 percent of the survey area. It is about 30 percent Liscum soils, 30 percent Mosquito soils, 20 percent Histosols, and 20 percent soils of minor extent.

The Liscum soils consist of about 12 inches (30 centimeters) of peat over wet, grayish, stratified silt and fine sand. The Mosquito soils consist of about 12 inches (30 centimeters) of peat over 12 to 24 inches (30 to 60 centimeters) of wet, grayish silt over frozen silt. The Histosols consist of more than 16 inches (40 centimeters) of wet peat.

The vegetation consists of sedges and moss, bog birch and willow scrub, and tamarack and black spruce forests. The soils in this unit are suitable for

use as wildlife habitat and watershed. Wetness limits other uses.

Lupine-Moosehead-Gerstle Association

Shallow to deep, nearly level, well drained, loamy soils that are underlain by sand and gravel; on flood plains

This map unit is on the flood plains of the Tanana and Gerstle Rivers. The soils formed in river sediment. Permafrost generally is absent. The soils in this unit are rarely flooded or are not subject to flooding. Elevation is 1,050 to 1,250 feet (320 to 381 meters). Slope is 0 to 3 percent.

This unit makes up about 35 percent of the survey area. It is about 30 percent Lupine soils, 25 percent Moosehead soils, 25 percent Gerstle soils, and 20 percent soils of minor extent.

All three major soils consist of an organic mat 1 to 6 inches thick (3 to 15 centimeters) over stratified silt and fine sand underlain by sand and gravel. In the Lupine soils, the layer of silt and fine sand is 10 to 20 inches thick (25 to 50 centimeters). In the Moosehead soils, the layer of silt and fine sand is 20 to 40 inches thick (50 to 102 centimeters). In the Gerstle soils, the layer of silt and fine sand is more than 40 inches thick (102 centimeters).

The vegetation consists of black spruce, white spruce, quaking aspen, and paper birch forests with low shrubs and moss. The soils in this unit are generally suitable for agriculture. Droughtiness in the soils that have less than 20 inches (50 centimeters) of loamy topsoil over sand and gravel can inhibit the establishment of crops and reduce yields. The original forests generally have low timber productivity, but cleared areas could support productive second-growth stands.

Tanacross-Moosehead-Donnelly Association

Shallow over permafrost, nearly level to gently sloping, poorly drained, silty soils, and very shallow and moderately deep, nearly level, well drained and somewhat excessively drained, silty soils that are underlain by sand, gravel, and cobbles; on flood plains

This map unit is on the flood plains of the Tanana, Little Gerstle, and Johnson Rivers. The soils formed in wind- and river-deposited sediment. The soils in this unit are rarely flooded or are not subject to flooding. Elevation is 1,250 to 1,500 feet (381 to 457 meters). Slope is 0 to 5 percent.

This unit makes up about 15 percent of the survey area. It is about 30 percent Tanacross soils, 30 percent Moosehead soils, 20 percent Donnelly soils, and 20 percent soils of minor extent.

The Tanacross soils consist of an organic mat approximately 12 inches (30 centimeters) thick over 12 to 24 inches (30 to 60 centimeters) of silty material underlain by perennially frozen silty material. The Moosehead and Donnelly soils do not have permafrost. The Moosehead soils have an organic mat 1 to 6 inches (3 to 15 centimeters) thick over 20 to 40 inches (50 to 102 centimeters) of stratified silt and fine sand underlain by sand and gravel. These soils are rarely flooded. The Donnelly soils have an organic mat 2 to 7 inches (5 to 18 centimeters) thick over about 8 inches (20 centimeters) of silt loam underlain by gravel and cobbles. These soils are not subject to flooding.

The vegetation is mostly black spruce, low shrubs, and moss. Portions of this unit are suitable for agriculture. Agriculture is limited in some places by the shallow depth to a gravelly subsoil and the failure of some areas that have permafrost to dry out sufficiently after clearing. The original forests have low timber productivity, but cleared areas have the potential to support productive second-growth stands.

Typic Eutrocryepts-Typic Aquorthels-Typic Histoturbels Association

Deep, nearly level to steep, well drained, silty soils over sand and gravel, and shallow to deep over permafrost, nearly level to steep, poorly drained, silty soils; on glacial moraines

This map unit is on glacial moraines near the Alaska Range, in the southern part of the survey area. The soils formed in wind-deposited silt and fine sand that is 1 foot to more than 5 feet thick (30 to more than 152 centimeters) over coarse, sandy glacial till. The soils in this unit are not subject to flooding. Elevation is 1,200 to 1,800 feet (366 to 549 meters). Slope is 0 to 60 percent.

This unit makes up about 10 percent of the survey area. It is about 30 percent Typic Eutrocryepts, 30 percent Typic Aquorthels, 30 percent Typic Histoturbels, and 10 percent soils of minor extent.

The Typic Eutrocryepts are dry and do not have permafrost. These soils are on hill crests and slopes and on south aspects. They have an organic mat 1 to 8 inches thick (2 to 20 centimeters) over 12 to 60 inches (30 to 152 centimeters) of silt loam underlain by sand and gravel. The Typic Aquorthels are on lower lying slopes and on the other slope aspects. They have an organic mat 2 to 6 inches thick

(5 to 15 centimeters) over 22 to 48 inches (60 to 122 centimeters) of grayish silt loam underlain by frozen silt loam. The Typic Histoturbels are on lower lying slopes and in depressions. They have an organic mat 8 to 16 inches thick (20 to 40 centimeters) over 12 to 24 inches (30 to 60 centimeters) of grayish silt loam underlain by frozen silt loam.

The vegetation is mostly paper birch and white spruce on the hill slopes and black spruce, low shrubs, and moss in the depressions. This unit is well suited to recreation and wildlife habitat because of the many small lakes. The soils that are on gentle slopes and do not have permafrost are suitable as homesites. The soils are suitable for forestry if erosion-control measures are applied on the steep slopes.

Tetlin-Typic Eutrocryepts Association

Shallow and moderately deep over permafrost, gently sloping to steep, poorly drained, silty soils, and shallow to deep over bedrock, steep, well drained and somewhat excessively drained soils; on bedrock uplands

This map unit is on hills that rise above the flood plains. The soils formed in wind-deposited silt and sand over weathered granitic bedrock. These soils generally are not subject to flooding, except in areas near small ephemeral streams that cross the Tetlin soils. Elevation is 1,250 to 1,950 feet (381 to 594 meters). Slope is 3 to 60 percent.

This unit makes up about 5 percent of the survey area. It is about 50 percent Tetlin soils, 35 percent Typic Eutrocryepts, and 15 percent soils of minor extent.

The Typic Eutrocryepts are dry and do not have permafrost. These soils are mainly on steep, south-facing slopes. They have an organic mat 0 to 8 inches thick (0 to 20 centimeters) over 12 to 48 inches (30 to 102 centimeters) of silt loam over bedrock. The Tetlin soils are on other slope aspects and on footslopes. These soils have permafrost. They have an organic mat 4 to 8 inches thick (10 to 20 centimeters) over 12 to 36 inches (30 to 91 centimeters) of grayish silt loam over frozen silt loam.

The vegetation is white spruce and quaking aspen on south-facing slopes and white spruce, black spruce, and paper birch on north-facing slopes. The steep slopes limit use of the soils in this unit. The unit supports productive forests, but harvesting is difficult and the hazard of erosion is high because of the slope.

Detailed Soil Map Units

The map units delineated on the detailed maps at the back of this survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this section, along with the maps, can be used to determine the suitability and potential of a unit for specific uses. They also can be used to plan the management needed for those uses. More information about each map unit is given under the heading "Use and Management of the Soils."

A map unit delineation on the detailed soil maps represents an area on the landscape and consists of one or more soils or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils or miscellaneous areas. Within a taxonomic class, there are precisely defined limits for the properties of the soils. On the landscape, however, the soils and miscellaneous areas are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some "included" areas that belong to other taxonomic classes.

Most included soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, inclusions. They may or may not be mentioned in the map unit description. Other included soils and miscellaneous areas, however, have properties and behavioral characteristics different enough to affect use or to require different management. These are called contrasting, or dissimilar, inclusions. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. The included areas of contrasting soils or miscellaneous areas are mentioned in the map unit descriptions. A few included areas may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of included areas in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans, but if intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. All the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying layers. They also can differ in slope, wetness, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Many of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Jarvis silt loam, moderately deep, is a phase of the Jarvis series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Histosols-Liscum complex is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be

mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Lupine and Moosehead silt loams is an undifferentiated group in this survey area.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Riverwash is an example.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see "Contents") give properties of the soils and the limitations, capabilities, and potentials for many uses. The glossary defines many of the terms used in describing the soils or miscellaneous areas. Scientific names of plants mentioned in the map unit descriptions are given in the Appendix.

201—Aquic Eutrocryepts-Tanacross complex

Composition

Aquic Eutrocryepts and similar soils—30 to 60 percent
Tanacross and similar soils—30 to 60 percent
Contrasting inclusions—15 percent

Characteristics of the Aquic Eutrocryepts and Similar Soils

Position on landscape: Flood plains
Slope range: 0 to 3 percent
Thickness of organic mat on surface: 4 to 10 inches (10 to 24 centimeters)
Representative profile:
7 inches (23 centimeters) to 0—dark brown, slightly decomposed organic matter
0 to 2 inches (0 to 5 centimeters)—dark brown silt loam
2 to 18 inches (5 to 46 centimeters)—brown, mottled, stratified silt to fine sand
18 to 28 inches (46 to 71 centimeters)—olive brown coarse sand
28 to 60 inches (71 to 152 centimeters)—extremely gravelly sand
Drainage class: Somewhat poorly drained
Permeability: In the organic mat—rapid; in the medium textured layers—moderate; in the coarse textured layers—moderately rapid
Available water capacity: Moderate
Depth to sand and gravel: 10 to 60 inches (25 to 152 centimeters) or more from the mineral soil surface
Runoff: Very slow
Depth to seasonal high water table: Usually more than 6 feet (1.8 meters); perched near the surface in spring
Hazard of erosion: By water—none if organic mat is not removed, slight if mat is removed; by wind—none if mat is not removed, severe if mat is removed
Frequency of flooding: Rare or none

Characteristics of the Tanacross and Similar Soils

Position on landscape: Flood plains
Slope range: 0 to 3 percent
Thickness of organic mat on surface: 5 to 15 inches (13 to 38 centimeters)
Typical profile:
8 inches (20 centimeters) to 0—dark brown, slightly decomposed organic matter
0 to 6 inches (0 to 15 centimeters)—black mucky silt loam
6 to 22 inches (15 to 56 centimeters)—dark grayish brown, stratified silt to fine sandy loam
22 to 40 inches (56 to 100 centimeters)—dark grayish brown, frozen, stratified silt to fine sandy loam
Depth to permafrost: 4 to 28 inches (10 to 71 centimeters) from the mineral soil surface in uncleared areas; more than 60 inches (152 centimeters) in cleared areas
Drainage class: Poorly drained in uncleared areas; somewhat poorly drained to moderately well drained in cleared areas
Permeability: In the organic mat—rapid; in the medium textured layers—moderate; in the frozen layer—impermeable
Available water capacity: Low in uncleared areas; high in cleared and thawed areas
Runoff: Very slow
Depth to seasonal high water table: 0 to 1 foot (0.3 meter)
Hazard of erosion: By water—none if organic mat is not removed, slight if mat is removed; by wind—none if organic mat is not removed, severe if mat is removed
Frequency of flooding: Rare or none

Included Areas

• Wet soils that do not have permafrost and are in depressions

Major Uses

Current use: Wildlife habitat
Potential uses: Cropland, hayland and pasture

Major Management Factors

Elevation: 1,100 to 1,500 feet (335 to 457 meters)
Soil-related factors: Wetness and permafrost

For more information on management, see the section "Use and Management of the Soils."

Native Vegetation (Aquic Eutrocryepts)

Major forest type: Black spruce
Major tree species: Black spruce
Minor tree species: White spruce
Major understory species: Labrador tea ledum, bog blueberry, diamondleaf willow, lingonberry, black crowberry, horsetail, cottonsedge, sedge, and moss

Native Vegetation (Tanacross)

Major forest type: Black spruce (fig. 1)
Major tree species: Black spruce
Minor tree species: White spruce
Major understory species: Labrador tea ledum, diamondleaf willow, bog blueberry, polargrass, lingonberry, black crowberry, horsetail, feathermoss, and lichen

202— Aquic Eutrocryepts-Typic Cryaquepts complex

Composition

Aquic Eutrocryepts and similar soils— 30 to 70 percent
Typic Cryaquepts and similar soils— 20 to 60 percent
Contrasting inclusions— 15 percent

Characteristics of the Aquic Eutrocryepts and Similar Soils

Position on landscape: Flood plains
Slope range: 0 to 3 percent
Thickness of organic mat on surface: 2 to 10 inches (5 to 25 centimeters)
Representative profile:
5 inches (13 centimeters) to 0—dark brown, slightly decomposed organic matter
0 to 7 inches (0 to 18 centimeters)—very dark grayish brown and brown silt loam
7 to 33 inches (18 to 84 centimeters)—dark yellowish brown and olive gray, stratified silt loam to fine sand
33 to 60 inches (84 to 152 centimeters)—very dark grayish brown extremely gravelly sand
Drainage class: Somewhat poorly drained
Permeability: In the organic mat—rapid; in the medium textured layers—moderate; in the coarse textured layers—moderately rapid

Figure 1.—Small black spruce trees and low shrubs, sedges, and moss in an area of the Tanacross soil. The soil is wet and has permafrost.

Available water capacity: Low to high
Depth to sand and gravel: 20 to 60 inches (51 to 152 centimeters) or more from the mineral soil surface
Runoff: Very slow
Depth to seasonal high water table: 2 to 6 feet (0.6 to 1.8 meters) or more
Hazard of erosion: By water—none if organic mat is not removed, slight if mat is removed; by wind—none if organic mat is not removed, severe if mat is removed
Frequency of flooding: Rare or none

Characteristics of the Typic Cryaquepts and Similar Soils

Position on landscape: Depressions that receive groundwater discharge and are on flood plains
Slope range: 0 to 2 percent
Thickness of organic mat on surface: 3 to 10 inches (8 to 25 centimeters)
Representative profile:
4 inches (10 centimeters) to 0—black mucky peat
0 to 5 inches (0 to 12 centimeters)—dark greenish gray silt loam
5 to 9 inches (12 to 24 centimeters)—brown and dark greenish gray silt loam
9 to 55 inches (24 to 139 centimeters)—brown and olive gray silt loam
55 to 61 inches (139 to 155 centimeters)—dark gray silt loam
61 to 65 inches (155 to 165 centimeters)—very dark brown very gravelly sand
Drainage class: Poorly drained
Permeability: In the organic mat—rapid; in the medium textured layers—moderate; in the coarse textured layers—moderately rapid
Available water capacity: Low to high
Depth to sand and gravel: 10 to 60 inches (25 to 152 centimeters) or more from the mineral soil surface
Runoff: Ponded
Depth to seasonal high water table: 0 to 3 feet (0.9 meter)
Hazard of erosion: By water—none if organic mat is not removed, slight if mat is removed; by wind—none if organic mat is not removed, severe if mat is removed
Frequency of flooding: Rare or none

Included Areas

- Soils that have permafrost
- Soils that have short, steep slopes and are on the sides of channels
- Ponded areas
- Drier soils in high-lying spots

Major Uses

Current uses: Cropland, hayland and pasture, and wildlife habitat
Potential use: Forestry

Major Management Factors

Elevation: 1,000 to 1,150 feet (305 to 351 meters)
Soil-related factors: Wetness and the included soils on short, steep slopes

For more information on management, see the section "Use and Management of the Soils."

Native Vegetation (Aquic Eutrocryepts)

Major forest types: Black spruce-tamarack and black spruce
Minor forest type: White spruce
Major tree species: Black spruce, tamarack, and white spruce
Minor tree species: Paper birch and quaking aspen
Major understory species: Black spruce-tamarack and black spruce forest types—bog birch, Labrador tea ledum, diamondleaf willow, lingonberry, horsetail, reedgrass, and feathermoss; white spruce forest type—prickly rose, lingonberry, horsetail, reedgrass, bunchberry dogwood, American twinflower, and feathermoss

Native Vegetation (Typic Cryaquepts)

Major forest types: Black spruce-tamarack, black spruce, and tamarack
Minor vegetation type: Bog birch shrub
Major tree species: Black spruce and tamarack
Minor tree species: White spruce
Major understory species: Black spruce-tamarack, black spruce, and tamarack forest types—bog birch, Labrador tea ledum, bog blueberry, lingonberry, horsetail, reedgrass, sedge, and feathermoss
Major plant species: Bog birch shrub vegetation type—bog birch, bog blueberry, Labrador tea ledum, horsetail, sedge, reedgrass, and moss

203—Aquic Cryofluvents-Typic Cryaquents complex

Composition

Aquic Cryofluvents and similar soils—60 to 80 percent
Typic Cryaquents and similar soils—20 to 40 percent
Contrasting inclusions—15 percent

Characteristics of the Aquic Cryofluvents and Similar Soils

Position on landscape: Flood plains
Slope range: 0 to 2 percent
Thickness of organic mat on surface: 4 to 10 inches (10 to 25 centimeters)
Representative profile:
7 inches (18 centimeters) to 0—dark brown, slightly decomposed organic matter
0 to 2 inches (0 to 5 centimeters)—dark grayish brown and olive brown silt loam
2 to 30 inches (5 to 76 centimeters)—dark grayish brown and olive brown, stratified silt loam to fine sand
30 to 40 inches (76 to 102 centimeters)—dark grayish brown, stratified sand and fine sand
40 to 46 inches (102 to 117 centimeters)—dark brown, stratified, slightly decomposed organic matter
46 to 60 inches (117 to 152 centimeters)—dark gray silty clay loam
Drainage class: Somewhat poorly drained
Permeability: In the organic mat—rapid; in the medium textured layers—moderate; in the coarse textured layers (where present)—rapid
Available water capacity: Moderate or high
Depth to sand and gravel: More than 35 inches (89 centimeters) from the mineral soil surface
Runoff: Very slow
Depth to seasonal high water table: 1.5 to 4.0 feet (0.5 to 1.2 meters)
Hazard of erosion: By water—none if organic mat is not removed, slight if mat is removed; by wind—none if organic mat is not removed, severe if mat is removed
Frequency of flooding: Rare

Characteristics of the Typic Cryaquents and Similar Soils

Position on landscape: Flood plains
Slope range: 0 to 2 percent
Thickness of organic mat on surface: 2 to 6 inches (5 to 15 centimeters)
Representative profile:
5 inches (13 centimeters) to 0—dark brown, moderately decomposed organic matter
0 to 1 inch (0 to 3 centimeters)—gray and dark yellowish brown silty clay loam
1 inch to 7 inches (3 to 18 centimeters)—gray and dark yellowish brown sand
7 to 25 inches (18 to 64 centimeters)—dark gray sand
25 to 28 inches (64 to 71 centimeters)—black, highly decomposed organic matter
28 to 60 inches (71 to 152 centimeters)—dark gray, stratified silt loam and loamy fine sand
Drainage class: Poorly drained
Permeability: In the organic mat—rapid; in the medium textured layers—moderate; in the coarse textured layers (where present)—rapid
Available water capacity: Moderate or high
Depth to sand and gravel: More than 35 inches (89 centimeters) from the mineral soil surface
Runoff: Very slow
Depth to seasonal high water table: 0 to 2 feet (0.6 meter)
Hazard of erosion: By water—none if organic mat is not removed, slight if mat is removed; by wind—none if organic mat is not removed, severe if mat is removed
Frequency of flooding: Rare or occasional

Included Areas

- Salchaket soils

Major Use

Current use: Wildlife habitat

Major Management Factors

Elevation: 1,000 to 1,100 feet (305 to 335 meters)
Soil-related factors: High water table and flooding

For more information on management, see the section "Use and Management of the Soils."

Native Vegetation (Aquic Cryofluvents)

Major forest types: White spruce and spruce-tamarack
Minor forest type: Black spruce
Major tree species: White spruce, black spruce, and tamarack
Minor tree species: Balsam poplar and paper birch
Major understory species: White spruce forest type—prickly rose, reedgrass, horsetail, lingonberry, bunchberry dogwood, American twinflower, and feathermoss; spruce-tamarack and black spruce forest types—Labrador tea ledum, bog blueberry, willow, reedgrass, horsetail, bunchberry dogwood, and feathermoss

Native Vegetation (Typic Cryaquents)

Major vegetation type: Bog birch shrub
Minor vegetation type: Sedge-grass moist meadow
Major plant species: Bog birch shrub vegetation type—bog birch, diamondleaf willow and other willows, bog blueberry, shrubby cinquefoil, water sedge and other sedges, swamp cinquefoil, and horsetail; sedge-grass moist meadow vegetation

type—various sedges, reedgrass, swamp cinquefoil, bog birch, diamondleaf willow, bog blueberry, and moss

204—Beales-Lupine complex, steep

Composition

Beales and similar soils—50 to 80 percent
Lupine and similar soils—20 to 40 percent
Contrasting inclusions—10 percent

Characteristics of the Beales and Similar Soils

Position on landscape: Crests and side slopes of small dunes on flood plains
Slope range: 0 to 35 percent
Slope features: Convex to plane
Thickness of organic mat on surface: 2 to 5 inches (5 to 13 centimeters)
Typical profile:
3 inches (8 centimeters) to 0—brown, slightly decomposed organic matter
0 to 2 inches (0 to 5 centimeters)—light brownish gray silt loam
2 to 29 inches (5 to 104 centimeters)—dark yellowish brown, stratified very fine sandy loam to fine sand
29 to 60 inches (104 to 152 centimeters)—dark grayish brown sand
Drainage class: Somewhat excessively drained
Permeability: In the organic mat—rapid; in the medium textured layers—moderate; in the coarse textured layers—moderately rapid
Available water capacity: Low
Depth to fine sand: 2 to 16 inches (5 to 41 centimeters) from the mineral soil surface
Runoff: Rapid
Depth to seasonal high water table: More than 6 feet (1.8 meters)
Hazard of erosion: By water—none if organic mat is not removed, severe if mat is removed; by wind—none if organic mat is not removed, severe if mat is removed
Frequency of flooding: None

Characteristics of the Lupine and Similar Soils

Position on landscape: Depressions between dunes on flood plains
Slope range: 0 to 3 percent
Slope features: Plane
Thickness of organic mat on surface: 1 inch to 9 inches (3 to 23 centimeters)
Typical profile:
4 inches (10 centimeters) to 0—dark brown, slightly decomposed organic matter
0 to 4 inches (0 to 10 centimeters)—dark grayish brown silt loam
4 to 12 inches (10 to 30 centimeters)—strong brown silt loam
12 to 60 inches (30 to 152 centimeters)—extremely gravelly sand
Drainage class: Well drained
Permeability: In the organic mat—rapid; in the medium textured layers—moderate; in the coarse textured layers—moderately rapid
Available water capacity: Low
Depth to sand and gravel: 8 to 30 inches (20 to 76 centimeters) from the mineral soil surface
Runoff: Very slow
Depth to seasonal high water table: More than 6 feet (1.8 meters)
Hazard of erosion: By water—none if organic mat is not removed, slight if mat is removed; by wind—none if organic mat is not removed, severe if mat is removed
Frequency of flooding: Rare or none

Included Areas

- Wetter soils in depressions

Major Uses

Current uses: Hayland and pasture and wildlife habitat
Potential use: Forestry

Major Management Factors

Elevation: 1,150 to 1,250 feet (351 to 381 meters)
Soil-related factors: Steep slopes, shallow depth to sandy subsoil, and low available water capacity

For more information on management, see the section "Use and Management of the Soils."

Native Vegetation

Major forest types: White spruce and spruce-quaking aspen (fig. 2)
Minor forest type: Spruce
Major tree species: White spruce and quaking aspen
Minor tree species: Black spruce, balsam poplar, and paper birch
Major understory species: Willow, prickly rose, lingonberry, horsetail, reedgrass, and feathermoss

Figure 2.—Vegetation on the Lupine soil. Willows and aspens are regenerating after the field was cleared for agriculture and then abandoned. The strip of native spruce forest at right was left as a windbreak. The brush at left is growing on a windrow of debris from land clearing.

205— Cryofluvents, occasionally flooded

Composition

Cryofluvents and similar soils—85 percent
Contrasting inclusions— 15 percent

Characteristics of the Cryofluvents and Similar Soils

Position on landscape: Flood plains
Slope range: 0 to 3 percent
Thickness of organic mat on surface: 0 to 3 inches (0 to 8 centimeters)
Representative profile:
- 0 to 3 inches (0 to 8 centimeters)—dark grayish brown fine sandy loam
- 3 to 4 inches (8 to 10 centimeters)—dark brown peat
- 4 to 19 inches (10 to 48 centimeters)—dark grayish brown, stratified fine sand to silt
- 19 to 50 inches (48 to 127 centimeters)—grayish brown, stratified sand and fine sand
- 50 to 60 inches (127 to 152 centimeters)—variegated very gravelly sand

Drainage class: Poorly drained to well drained
Permeability: In the organic mat—rapid; in the medium textured layers—moderate; in the coarse textured layers—moderately rapid
Available water capacity: Low to high
Depth to sand and gravel: 18 to 60 inches (25 to 152 centimeters) or more from the mineral soil surface
Runoff: Very slow
Depth to seasonal high water table: 1 to 6 feet (0.3 to 1.8 meters) or more
Hazard of erosion: By water—none if organic mat is not removed, slight if mat is removed; by wind—none if organic mat is not removed, severe if mat is removed
Frequency of flooding: Occasional

Included Areas

- Frequently flooded areas
- Higher lying areas that are rarely flooded

Major Use

Current use: Wildlife habitat

Major Management Factors

Elevation: 1,000 to 1,400 feet (305 to 427 meters)
Soil-related factors: Flooding, and high water table in some areas

For more information on management, see the section "Use and Management of the Soils."

Native Vegetation

Major vegetation types: Willow shrub, alder-willow shrub, balsam poplar forest, and white spruce-balsam poplar forest
Minor vegetation type: White spruce forest
Major plant species: Willow shrub and alder-willow shrub vegetation types—thinleaf and green alder; feltleaf, littletree, Bebb, and other tall willows; balsam poplar and white spruce seedlings; and sweetvetch, field oxytrope, and other seral herbs
Major tree species: Balsam poplar and white spruce
Major understory species: Balsam poplar, white spruce-balsam poplar, and white spruce forest types—prickly rose, lingonberry, horsetail, northern commandra, bunchberry dogwood, wintergreen, and feathermoss

206—Cryofluvents, rarely flooded

Composition

Cryofluvents and similar soils—90 percent
Contrasting inclusions—10 percent

Characteristics of the Cryofluvents and Similar Soils

Position on landscape: Flood plains
Slope range: 0 to 3 percent
Thickness of organic mat on surface: 1 to 8 inches (3 to 20 centimeters)
Representative profile:
5 inches (13 centimeters) to 0—dark brown, slightly decomposed organic matter
0 to 2 inches (0 to 5 centimeters)—strong brown and dark brown silt loam
2 to 3 inches (5 to 8 centimeters)—very dark brown muck
3 to 25 inches (8 to 64 centimeters)—dark yellowish brown, stratified fine sand and silt
25 to 60 inches (64 to 152 centimeters)—variegated extremely gravelly sand
Drainage class: Moderately well drained to well drained
Permeability: In the organic mat—rapid; in the medium textured layers—moderate; in the coarse textured layers—moderately rapid
Available water capacity: Low or moderate
Depth to sand and gravel: 10 to 60 inches (25 to 152 centimeters) or more from the mineral soil surface
Runoff: Very slow
Depth to seasonal high water table: More than 6 feet (1.8 meters)
Hazard of erosion: By water—none if organic mat is not removed, slight if mat is removed; by wind—none if organic mat is not removed, severe if mat is removed
Frequency of flooding: Rare

Included Areas

- Soils that have short, steep slopes and are on the sides of channels
- Wetter soils in depressions
- Occasionally flooded areas

Major Uses

Current uses: Forestry and wildlife habitat

Major Management Factors

Elevation: 1,000 to 1,300 feet (305 to 396 meters)
Soil-related factors: Shallow depth to sand and gravel in some areas, flooding, and included soils on short, steep slopes

For more information on management, see the section "Use and Management of the Soils."

Native Vegetation

Major forest types: White spruce and white spruce-balsam poplar-paper birch
Minor forest types: Balsam poplar and spruce
Major tree species: White spruce
Minor tree species: Balsam poplar, paper birch, and black spruce
Major understory species: White spruce, white spruce-balsam poplar-paper birch, and balsam poplar forest types—prickly rose, lingonberry, horsetail, northern commandra, bunchberry dogwood, wintergreen, and feathermoss; spruce forest type—Labrador tea ledum, lingonberry, bog blueberry, black crowberry, prickly rose, horsetail, and feathermoss

207—Donnelly silt loam

Composition

Donnelly and similar soils—85 percent
Contrasting inclusions—15 percent

Characteristics of the Donnelly and Similar Soils

Position on landscape: Stream terraces
Slope range: 0 to 3 percent

Thickness of organic mat on surface: 2 to 7 inches (5 to 18 centimeters)
Typical profile:
2 inches (5 centimeters) to 0—dark brown, slightly decomposed organic matter
0 to 6 inches (0 to 15 centimeters)—very dark brown silt loam
6 to 12 inches (15 to 30 centimeters)—dark yellowish brown very gravelly sandy loam
12 to 60 inches (30 to 152 centimeters)—variegated extremely gravelly sand
Drainage class: Somewhat excessively drained
Permeability: In the organic mat—rapid; in the medium textured layers—moderate; in the coarse textured layers—moderately rapid
Available water capacity: Low
Depth to sand, gravel, and cobbles: 0 to 10 inches (0 to 25 centimeters) from the mineral soil surface
Runoff: Very slow
Depth to seasonal high water table: More than 6 feet (1.8 meters)
Hazard of erosion: By water—none if organic mat is not removed, slight if mat is removed; by wind—none if mat is not removed, severe if mat is removed
Frequency of flooding: None

Included Areas

- Soils that have permafrost and are in depressions
- Soils that are subject to flooding and are near channels
- Soils that have sand and cobbles below a depth of 10 inches (25 centimeters)

Major Uses

Current uses: Forestry and wildlife habitat

Major Management Factors

Elevation: 1,300 to 1,500 feet (396 to 457 meters)
Soil-related factors: Shallow depth to sand, gravel, and cobbles and low available water capacity

For more information on management, see the section "Use and Management of the Soils."

Native Vegetation

Major forest types: Black spruce-quaking aspen and black spruce
Major tree species: Black spruce and quaking aspen
Minor tree species: White spruce
Major understory species: Labrador tea ledum, lingonberry, kinnikinnick, russet buffaloberry, northern commandra, altai fescue, fruticose lichen, and moss

208—Gerstle silt loam

Composition

Gerstle and similar soils—85 percent
Contrasting inclusions—15 percent

Characteristics of the Gerstle and Similar Soils

Position on landscape: Flood plains
Slope range: 0 to 3 percent
Thickness of organic mat on surface: 2 to 8 inches (5 to 20 centimeters)
Typical profile:
8 inches (20 centimeters) to 0—dark brown, slightly decomposed organic matter
0 to 2 inches (0 to 5 centimeters)—black and brown silt loam
2 to 35 inches (5 to 89 centimeters)—brown, mottled, stratified silt loam to loamy fine sand
35 to 60 inches (89 to 152 centimeters)—dark grayish brown silt loam
Drainage class: Well drained
Permeability: In the organic mat—rapid; in the medium textured layers—moderate; in the coarse textured layers—moderately rapid
Available water capacity: Moderate or high
Depth to sand and gravel: 35 to 60 inches (89 to 152 centimeters) or more from the mineral soil surface
Runoff: Very slow
Depth to seasonal high water table: Usually more than 6 feet (1.8 meters); perched near surface in spring
Hazard of erosion: By water—none if organic mat is not removed, slight if mat is removed; by wind—none if mat is not removed, severe if mat is removed
Frequency of flooding: Rare or none

Included Areas

- Silty soils that do not have sandy layers
- Salchaket soils
- Jarvis soils
- Beales soils
- Wetter soils in channel depressions that have short, steep slopes

Major Uses

Current uses: Cropland, hayland and pasture, and wildlife habitat
Potential use: Forestry

Major Management Factors

Elevation: 1,050 to 1,500 feet (320 to 457 meters)

Soil-related factor: Susceptibility to wind erosion

For more information on management, see the section "Use and Management of the Soils."

Native Vegetation

Major forest type: Spruce
Minor forest type: White spruce
Major tree species: Black spruce and white spruce
Minor tree species: Quaking aspen
Major understory species: Labrador tea ledum, lingonberry, bog blueberry, black crowberry, prickly rose, horsetail, and feathermoss

209—Typic Histoturbels-Histosols complex, gently sloping

Composition

Typic Histoturbels and similar soils—30 to 70 percent
Histosols and similar soils—20 to 60 percent
Contrasting inclusions—10 percent

Characteristics of the Typic Histoturbels and Similar Soils

Position on landscape: Depressions on glacial moraines
Slope range: 0 to 5 percent
Thickness of organic mat on surface: 8 to 16 inches (20 to 40 centimeters)
Representative profile:
12 to 6 inches (30 to 15 centimeters)—dark brown peat
6 inches (15 centimeters) to 0—black mucky silt loam
0 to 6 inches (0 to 15 centimeters)—very dark grayish brown silt loam
6 to 10 inches (15 to 25 centimeters)—dark grayish brown, frozen silt loam
Depth to permafrost: 0 to 15 inches (0 to 38 centimeters) from the mineral soil surface
Drainage class: Poorly drained
Permeability: In the organic mat—rapid; in the medium textured layers—moderate; in the frozen layer—impermeable
Available water capacity: Low
Runoff: Slow
Depth to seasonal high water table: 0 to 1 foot (0.3 meter)
Hazard of erosion: By water—none if organic mat is not removed, slight if mat is removed; by wind—none if mat is not removed, severe if mat is removed
Frequency of flooding: None

Characteristics of the Histosols and Similar Soils

Position on landscape: Depressions on glacial moraines
Slope range: 0 to 2 percent
Thickness of organic mat on surface: More than 16 inches (40 centimeters)
Representative profile:
0 to 9 inches (0 to 23 centimeters)—dark brown, slightly decomposed organic matter
9 to 17 inches (23 to 43 centimeters)—black, moderately decomposed organic matter
17 to 60 inches (43 to 152 centimeters)—frozen, black, moderately decomposed organic matter
Depth to permafrost: 15 to 30 inches (38 to 76 centimeters) from the surface
Drainage class: Very poorly drained
Permeability: In the slightly decomposed organic matter—rapid; in the moderately decomposed to highly decomposed organic matter—moderate or slow; in the frozen layer—impermeable
Available water capacity: Low
Runoff: Slow
Depth to seasonal high water table: Ponded to a depth of 1 foot (0.3 meter)
Hazard of erosion: By water—slight; by wind—none if vegetation is not removed, severe if vegetation is removed and soil is drained
Frequency of flooding: None

Included Areas

• Soils that have an organic mat less than 8 inches thick (20 centimeters)

Major Use

Current use: Wildlife habitat

Major Management Factors

Elevation: 1,300 to 1,600 feet (396 to 488 meters)
Soil-related factors: Wetness, permafrost, and ponding

For more information on management, see the section "Use and Management of the Soils."

Native Vegetation (Typic Histoturbels)

Major forest type: Black spruce
Minor forest type: Black spruce-paper birch
Major tree species: Black spruce
Minor tree species: Paper birch and white spruce
Major understory species: Labrador tea ledum, bog birch, polargrass, lingonberry, black crowberry, sedge, cloudberry, and moss

Native Vegetation (Histosols)

Major vegetation type: Black spruce-dwarf tree scrub
Minor forest type: Black spruce
Major tree species: Black spruce
Minor tree species: Paper birch and white spruce
Major understory species: Labrador tea ledum, bog blueberry, bog birch, leatherleaf, lingonberry, cloudberry, cottongrass, sedge, and moss

210—Histosols-Liscum complex

Composition

Histosols and similar soils—40 to 60 percent
Liscum and similar soils—40 to 60 percent
Contrasting inclusions—15 percent

Characteristics of the Histosols and Similar Soils

Position on landscape: Flood plains
Slope range: 0 to 2 percent
Thickness of organic mat on surface: More than 16 inches (41 centimeters)
Representative profile:
0 to 7 inches (0 to 18 centimeters)—very dark brown, slightly decomposed organic matter
7 to 8 inches (18 to 20 centimeters)—gray silt loam
8 to 20 inches (20 to 51 centimeters)—very dark brown, moderately decomposed organic matter
20 to 30 inches (51 to 76 centimeters)—gray and very dark brown silt loam
30 to 60 inches (76 to 152 centimeters)—olive brown and gray very fine sandy loam
Depth to permafrost: Where present, 20 to 30 inches (50 to 76 centimeters) below the surface, but absent in just over one-half of the unit
Drainage class: Very poorly drained
Permeability: In the slightly decomposed organic matter—rapid; in the moderately decomposed organic matter and the medium textured layers—moderate; in the frozen layer (where present)—impermeable
Available water capacity: High
Runoff: Very slow
Depth to seasonal high water table: Ponded to a depth of 1 foot (0.3 meter)
Hazard of erosion: By water—none if organic mat is not removed, slight if mat is removed; by wind—none if mat is not removed, severe if soil is drained and mat is removed
Frequency of flooding: Rare

Characteristics of the Liscum and Similar Soils

Position on landscape: Flood plains
Slope range: 0 to 2 percent
Thickness of organic mat on surface: 7 to 16 inches (18 to 41 centimeters)
Typical profile:
13 to 8 inches (33 to 20 centimeters)—dark brown, slightly decomposed peat
8 inches (20 centimeters) to 0—dark brown muck
0 to 11 inches (0 to 28 centimeters)—gray and black silt loam
11 to 27 inches (28 to 69 centimeters)—gray and light olive brown silt loam
27 to 60 inches (69 to 152 centimeters)—dark yellowish brown and dark grayish brown silt loam
Drainage class: Very poorly drained
Permeability: In the organic mat—rapid; in the medium textured layers—moderate; in the coarse textured layers (where present)—rapid
Available water capacity: High
Depth to sand and gravel: More than 40 inches (102 centimeters) from the mineral soil surface
Runoff: Very slow
Depth to seasonal high water table: 0 to 1 foot (0.3 meter)
Hazard of erosion: By water—none if organic mat is not removed, slight if mat is removed; by wind—none if mat is not removed, severe if mat is removed
Frequency of flooding: Rare

Included Areas

- Jarvis soils
- Soils that have permafrost
- Ponds
- Drier soils in high-lying spots

Major Use

Current use: Wildlife habitat

Major Management Factors

Elevation: 1,000 to 1,150 feet (305 to 357 meters)
Soil-related factors: Wetness and organic soil material

For more information on management, see the section “Use and Management of the Soils.”

Native Vegetation (Histosols)

Major vegetation types: Bog birch shrub and sedge wet meadow
Major plant species: Bog birch shrub vegetation type—bog birch, sweet gale, shrubby cinquefoil,

diamondleaf willow, bog blueberry, Labrador tea ledum, cottonsedge, sedge, swamp cinquefoil, and reedgrass; sedge wet meadow vegetation type—water sedge, Northwest Territory sedge, and other tall sedges; reedgrass; swamp cinquefoil; marsh horsetail; beachhead iris; Mackenzie's water hemlock; bog birch; and sweet gale

Native Vegetation (Liscum Soil)

Major vegetation types: Tamarack woodland and bog birch shrub
Minor vegetation type: Black spruce-tamarack woodland
Major tree species: Tamarack and black spruce
Minor tree species: Paper birch and balsam poplar
Major understory species: Tamarack and black spruce-tamarack woodland types—bog birch, Labrador tea ledum, bog blueberry, shrubby cinquefoil, willow, horsetail, sweet-colt's-foot, sedge, reedgrass, cottonsedge, and moss
Major plant species: Bog birch shrub vegetation type—bog birch, bog blueberry, Labrador tea ledum, sedge, cottonsedge, willow, sweet gale, shrubby cinquefoil, and reedgrass

211—Iksgiza peat, undulating

Composition

Iksgiza and similar soils—85 percent
Contrasting inclusions—15 percent

Characteristics of the Iksgiza and Similar Soils

Position on landscape: Low dunes on flood plains
Slope range: 0 to 8 percent
Thickness of organic mat on surface: 5 to 11 inches (13 to 28 centimeters)
Typical profile:
10 to 4 inches (25 to 10 centimeters)—dark brown, slightly decomposed peat
4 inches (10 centimeters) to 0—black muck
0 to 2 inches (0 to 5 centimeters)—black mucky silt loam
2 to 10 inches (5 to 25 centimeters)—dark grayish brown and black, mottled silt loam
10 to 20 inches (25 to 51 centimeters)—dark grayish brown and black, frozen silt loam
Depth to permafrost: 3 to 26 inches (8 to 66 centimeters) from the mineral soil surface in uncleared areas; more than 60 inches (152 centimeters) in cleared areas
Drainage class: Poorly drained
Permeability: In the organic mat—rapid; in the medium textured layers—moderate; in the frozen layer—impermeable
Available water capacity: Low
Depth to sand: 18 to 40 inches (46 to 102 centimeters) from the mineral soil surface
Runoff: Medium
Depth to seasonal high water table: 0 to 1.5 feet (0.5 meter) in uncleared areas; more than 6 feet (1.8 meters) in cleared areas
Hazard of erosion: By water—none if organic mat is not removed, moderate if mat is removed; by wind—none if mat is not removed, severe if mat is removed
Frequency of flooding: None

Included Areas

- Soils that have steeper slopes
- Soils that do not have permafrost
- Wetter soils in depressions

Major Use

Current use: Wildlife habitat

Major Management Factors

Elevation: 1,200 to 1,350 feet (366 to 411 meters)
Soil-related factors: Wetness, permafrost, and included soils that have steeper slopes

For more information on management, see the section "Use and Management of the Soils."

Native Vegetation

Major forest type: Black spruce
Minor forest type: Spruce
Major tree species: Black spruce
Minor tree species: White spruce
Major understory species: Labrador tea ledum, bog blueberry, lingonberry, black crowberry, dwarf scouringrush, feathermoss, and lichen

212—Jarvis silt loam, shallow

Composition

Jarvis and similar soils—85 percent
Contrasting inclusions—15 percent

Characteristics of the Jarvis and Similar Soils

Position on landscape: Flood plains
Slope range: 0 to 3 percent
Thickness of organic mat on surface: 1 to 6 inches (3 to 15 centimeters)

Typical profile:
4 inches (20 centimeters) to 0—dark brown, slightly decomposed organic matter
0 to 5 inches (0 to 13 centimeters)—brown silt loam
5 to 6 inches (13 to 15 centimeters)—black muck
6 to 15 inches (15 to 38 centimeters)—dark brown, stratified silt and very fine sand
15 to 60 inches (38 to 152 centimeters)—variegated extremely gravelly sand
Drainage class: Well drained
Permeability: In the organic mat—rapid; in the medium textured layers—moderate; in the coarse textured layers—moderately rapid
Available water capacity: Low
Depth to sand and gravel: 8 to 25 inches (20 to 64 centimeters) from the mineral soil surface
Runoff: Very slow
Depth to seasonal high water table: More than 6 feet (1.8 meters)
Hazard of erosion: By water—none if organic mat is not removed, slight if mat is removed; by wind—none if mat is not removed, severe if mat is removed
Frequency of flooding: Rare

Included Areas

- Chena soils
- Salchaket soils
- Soils in channels that have short, steep slopes

Major Uses

Current uses: Forestry, hayland and pastureland, and cropland

Major Management Factors

Elevation: 1,100 to 1,300 feet (335 to 396 meters)
Soil-related factors: Shallow depth to sand and gravel; included areas of soils in channels that have short, steep slopes; and flooding

For more information on management, see the section "Use and Management of the Soils."

Native Vegetation

Major forest types: White spruce and white spruce-quaking aspen
Minor forest types: Spruce-paper birch and white spruce-balsam poplar
Major tree species: White spruce and quaking aspen
Minor tree species: Paper birch, balsam poplar, and black spruce
Major understory species: White spruce, white spruce-quaking aspen, and white spruce-balsam poplar forest types—prickly rose, lingonberry, horsetail, northern commandra, bunchberry dogwood, wintergreen, and feathermoss; spruce-paper birch forest type—Labrador tea ledum, lingonberry, bog blueberry, black crowberry, prickly rose, horsetail, and feathermoss

213—Jarvis silt loam, moderately deep

Composition

Jarvis and similar soils—85 percent
Contrasting inclusions—15 percent

Characteristics of the Jarvis Soil and Similar Soils

Position on landscape: Flood plains
Slope range: 0 to 3 percent
Thickness of organic mat on surface: 1 to 7 inches (3 to 18 centimeters)
Typical profile:
4 inches (10 centimeters) to 0—dark brown, slightly decomposed organic matter
0 to 9 inches (0 to 23 centimeters)—light brownish gray silt loam
9 to 36 inches (23 to 91 centimeters)—grayish brown, stratified very fine sand and silt
36 to 60 inches (91 to 152 centimeters)—variegated extremely gravelly sand
Drainage class: Well drained
Permeability: In the organic mat—rapid; in the medium textured layers—moderate; in the coarse textured layers—moderately rapid
Available water capacity: Low or moderate
Depth to sand and gravel: 18 to 45 inches (46 to 114 centimeters) from the mineral soil surface
Runoff: Very slow
Depth to seasonal high water table: More than 6 feet (1.8 meters)
Hazard of erosion: By water—none if organic mat is not removed, slight if mat is removed; by wind—none if mat is not removed, severe if mat is removed
Frequency of flooding: Rare

Included Areas

- Chena soils
- Salchaket soils
- Soils in channels that have short, steep slopes
- Occasionally flooded areas

Major Uses

Current uses: Cropland, hayland and pasture, forestry, and wildlife habitat

Major Management Factors

Elevation: 1,050 to 1,250 feet (320 to 381 meters)
Soil-related factors: Depth to sand and gravel; included areas of soils in channels that have short, steep slopes; and flooding

For more information on management, see the section "Use and Management of the Soils."

Native Vegetation

Major forest types: White spruce and spruce-quaking aspen
Minor forest types: White spruce-balsam poplar and white spruce-paper birch
Major tree species: White spruce and quaking aspen
Minor tree species: Balsam poplar, paper birch, and black spruce
Major understory species: White spruce and white spruce-balsam poplar forest types—prickly rose, lingonberry, horsetail, northern commandra, bunchberry dogwood, wintergreen, and feathermoss; spruce-quaking aspen and white spruce-paper birch forest types—Labrador tea ledum, lingonberry, bog blueberry, black crowberry, prickly rose, horsetail, and feathermoss

214—Jarvis-Chena complex

Composition

Jarvis and similar soils—30 to 80 percent
Chena and similar soils—20 to 70 percent
Contrasting inclusions—15 percent

Characteristics of the Jarvis and Similar Soils

Position on landscape: Flood plains
Slope range: 0 to 3 percent
Thickness of organic mat on surface: 0 to 6 inches (0 to 15 centimeters)
Typical profile:
2 inches (5 centimeters) to 0—brown, slightly decomposed organic matter
0 to 5 inches (0 to 13 centimeters)—yellowish brown silt loam
5 to 20 inches (13 to 51 centimeters)—dark grayish brown, stratified silt loam to loamy very fine sand
20 to 60 inches (51 to 152 centimeters)—extremely gravelly sand
Drainage class: Well drained
Permeability: In the organic mat—rapid; in the medium textured layers—moderate; in the coarse textured layers—moderately rapid
Available water capacity: Low or moderate
Depth to sand and gravel: 10 to 45 inches (25 to 114 centimeters) from the mineral soil surface
Runoff: Very slow
Depth to seasonal high water table: More than 6 feet (1.8 meters)
Hazard of erosion: By water—none if organic mat is not removed, slight if mat is removed; by wind—none if mat is not removed, severe if mat is removed
Frequency of flooding: Rare

Characteristics of the Chena and Similar Soils

Position on landscape: Flood plains
Slope range: 0 to 3 percent
Thickness of organic mat on surface: 0 to 5 inches (0 to 13 centimeters)
Typical profile:
1 inch (3 centimeters) to 0—very dark brown, slightly decomposed organic matter
0 to 2 inches (0 to 5 centimeters)—brown loam
2 to 60 inches (5 to 152 centimeters)—extremely gravelly sand
Drainage class: Excessively drained
Permeability: In the organic mat—rapid; in the medium textured layers—moderate; in the coarse textured layers—moderately rapid
Available water capacity: Very low
Depth to sand and gravel: 0 to 10 inches (0 to 25 centimeters) from the mineral soil surface
Runoff: Very slow
Depth to seasonal high water table: More than 6 feet (1.8 meters)
Hazard of erosion: By water—none if organic mat is not removed, slight if mat is removed; by wind—none if mat is not removed, severe if mat is removed
Frequency of flooding: Rare

Included Areas

- Beales soils
- Occasionally flooded areas
- Soils that have short, steep slopes and are along dry channels
- Salchaket soils

Major Uses

Current uses: Forestry and wildlife habitat

Major Management Factors

Elevation: 1,050 to 1,300 feet (320 to 396 meters)
Soil-related factors: Shallow depth to sand and gravel, restricted available water capacity, and flooding

For more information on management, see the section "Use and Management of the Soils."

Native Vegetation

Major forest types: White spruce, white spruce-quaking aspen, and white spruce-balsam poplar
Minor forest type: White spruce-paper birch
Major tree species: White spruce, quaking aspen, and balsam poplar
Minor tree species: Paper birch and black spruce
Major understory species: White spruce and white spruce-balsam poplar forest types—prickly rose, lingonberry, horsetail, northern commandra, bunchberry dogwood, wintergreen, and feathermoss; white spruce-quaking aspen forest type—fruticose lichen, lingonberry, arctic lupine, russet buffaloberry, and moss; white spruce-paper birch forest type—Labrador tea ledum, lingonberry, bog blueberry, black crowberry, prickly rose, horsetail, and feathermoss

215—Koyukuk silt loam, rolling

Composition

Koyukuk and similar soils—85 percent
Contrasting inclusions—15 percent

Characteristics of the Koyukuk and Similar Soils

Position on landscape: Loess-mantled sand dunes on flood plains
Slope range: 0 to 15 percent
Thickness of organic mat on surface: 2 to 8 inches (5 to 20 centimeters)
Typical profile:
3 inches (8 centimeters) to 0—dark brown, slightly decomposed organic matter
0 to 10 inches (0 to 25 centimeters)—brown silt loam
10 to 28 inches (25 to 71 centimeters)—dark brown, mottled silt loam
28 to 60 inches (71 to 152 centimeters)—grayish brown silt loam
Drainage class: Well drained
Permeability: In the organic mat—rapid; in the medium textured layers—moderate; in the coarse textured layers (where present)—rapid
Available water capacity: High or very high
Depth to fine sand: More than 40 inches (102 centimeters) from the mineral soil surface
Runoff: Medium
Depth to seasonal high water table: More than 6 feet (1.8 meters)
Hazard of erosion: By water—none if organic mat is not removed, severe if mat is removed; by wind—none if mat is not removed, severe if mat is removed
Frequency of flooding: None

Included Areas

- Soils that have slopes of 15 to 40 percent
- Soils that have permafrost
- Jarvis soils

Major Uses

Current uses: Forestry and hayland and pasture

Major Management Factors

Elevation: 1,200 to 1,300 feet (366 to 396 meters)
Soil-related factor: Slope

For more information on management, see the section "Use and Management of the Soils."

Native Vegetation

Major forest type: White spruce-paper birch
Minor forest types: White spruce-quaking aspen and white spruce
Major tree species: White spruce and paper birch
Minor tree species: Quaking aspen and black spruce
Major understory species: White spruce-paper birch forest type—prickly rose, reedgrass, horsetail, lingonberry, bunchberry dogwood, American twinflower, and feathermoss; white spruce-quaking aspen and white spruce forest types—Labrador tea ledum, prickly rose, lingonberry, northern commandra, and feathermoss

216—Liscum and Mosquito peats

Composition

Liscum and similar soils—0 to 90 percent
Mosquito and similar soils—0 to 90 percent
Contrasting inclusions—10 percent

Characteristics of the Liscum and Similar Soils

Position on landscape: Flood plains
Slope range: 0 to 2 percent
Thickness of organic mat on surface: 6 to 16 inches (15 to 41 centimeters)
Typical profile:
12 to 6 inches (30 to 15 centimeters)—dark brown, slightly decomposed peat
6 inches (15 centimeters) to 0—black, moderately decomposed organic matter
0 to 19 inches (0 to 48 centimeters)—olive brown and gray, stratified silt loam and loamy fine sand
19 to 26 inches (48 to 66 centimeters)—very dark grayish brown muck
26 to 34 inches (66 to 86 centimeters)—black and dark gray silt loam
34 to 60 inches (86 to 152 centimeters)—greenish gray and dark gray silt loam
Drainage class: Very poorly drained
Permeability: In the organic mat—rapid; in the medium textured layers—moderate; in the coarse textured layers (where present)—rapid
Available water capacity: High
Depth to sand and gravel: 30 to 60 inches (76 to 152 centimeters) or more from the mineral soil surface
Runoff: Very slow
Depth to seasonal high water table: 0 to 1 foot (0.3 meter)
Hazard of erosion: By water—none if organic mat is not removed, slight if mat is removed; by wind—none if mat is not removed, severe if mat is removed
Frequency of flooding: Rare

Characteristics of the Mosquito and Similar Soils

Position on landscape: Flood plains
Slope range: 0 to 2 percent
Thickness of organic mat on surface: 4 to 15 inches (10 to 38 centimeters)
Typical profile:
10 to 8 inches (25 to 20 centimeters)—dark brown, slightly decomposed peat
8 inches (20 centimeters) to 0—black muck
0 to 8 inches (0 to 20 centimeters)—olive gray and olive brown, mottled silt loam
8 to 20 inches (20 to 50 centimeters)—dark yellowish brown and dark grayish brown, frozen silt loam
Depth to permafrost: 0 to 30 inches (0 to 76 centimeters) below the mineral soil surface
Drainage class: Very poorly drained
Permeability: In the organic mat—rapid; in the medium textured layers—moderate; in the frozen layer—impermeable
Available water capacity: High
Runoff: Very slow
Depth to seasonal high water table: Ponded to a depth of 1 foot (0.3 meter)
Hazard of erosion: By water—none if organic mat is not removed, slight if mat is removed; by wind—none if mat is not removed, severe if mat is removed
Frequency of flooding: Rare

Included Areas

- Histosols
- Drier soils

Major Use

Current use: Wildlife habitat

Major Management Factors

Elevation: 1,000 to 1,150 feet (305 to 351 meters)
Soil-related factors: Wetness and permafrost

For more information on management, see the section "Use and Management of the Soils."

Native Vegetation (Liscum Soil)

Major forest types: Black spruce-tamarack and black spruce
Minor vegetation types: Tamarack forest and bog birch shrub
Major tree species: Black spruce and tamarack
Minor tree species: Paper birch and balsam poplar
Major understory species: Black spruce-tamarack, black spruce, and tamarack forest types—Labrador tea ledum, bog blueberry, bog birch, shrubby cinquefoil, diamondleaf willow, sedge, horsetail, reedgrass, sweet-colt's-foot, and feathermoss
Major plant species: Bog birch shrub vegetation type—bog birch, bog blueberry, Labrador tea ledum, sedge, cottonsedge, willow, sweet gale, shrubby cinquefoil, and reedgrass

Native Vegetation (Mosquito Soil)

Major forest type: Tamarack
Minor vegetation types: Black spruce-tamarack forest and bog birch shrub
Major tree species: Black spruce and tamarack
Minor tree species: Paper birch
Major understory species: Tamarack and black spruce-tamarack forest types—bog birch, Labrador tea ledum, diamondleaf willow,

leatherleaf, shrubby cinquefoil, red fruit bearberry, lingonberry, cloudberry, cottonsedge, sedge, and moss
Major plant species: Bog birch shrub vegetation type—bog birch, bog blueberry, Labrador tea ledum, sedge, cottonsedge, willow, sweet gale, shrubby cinquefoil, and reedgrass

217—Lupine silt loam

Composition

Lupine and similar soils—85 percent
Contrasting inclusions—15 percent

Characteristics of the Lupine and Similar Soils

Position on landscape: Flood plains
Slope range: 0 to 3 percent
Thickness of organic mat on surface: 1 to 9 inches (3 to 23 centimeters)
Typical profile:
4 inches (10 centimeters) to 0—dark brown, slightly decomposed organic matter
0 to 3 inches (0 to 8 centimeters)—dark brown silt loam
3 to 11 inches (8 to 28 centimeters)—brown silt loam
11 to 15 inches (28 to 38 centimeters)—olive brown fine sand
15 to 60 inches (38 to 152 centimeters)—extremely gravelly sand
Drainage class: Well drained
Permeability: In the organic mat—rapid; in the medium textured layers—moderate; in the coarse textured layers—moderately rapid
Available water capacity: Low
Depth to sand and gravel: 8 to 30 inches (20 to 76 centimeters) from the mineral soil surface
Runoff: Very slow
Depth to seasonal high water table: More than 6 feet (1.8 meters)
Hazard of erosion: By water—none if organic mat is not removed, slight if mat is removed; by wind—none if mat is not removed, severe if mat is removed
Frequency of flooding: Rare or none

Included Areas

- Chena soils
- Salchaket soils
- Wet soils in channel depressions that have short, steep slopes
- Jarvis soils

Major Uses

Current uses: Cropland, hayland and pasture, and wildlife habitat
Potential use: Forestry

Major Management Factors

Elevation: 1,050 to 1,300 feet (320 to 396 meters)
Soil-related factors: Depth to sand and gravel, low available water capacity

For more information on management, see the section "Use and Management of the Soils."

Native Vegetation

Major forest types: Black spruce and spruce-quaking aspen
Minor forest types: White spruce, white spruce-paper birch, and white spruce-balsam poplar
Major tree species: Black spruce and quaking aspen
Minor tree species: White spruce, paper birch, and balsam poplar
Major understory species: Labrador tea ledum, lingonberry, bog blueberry, black crowberry, prickly rose, horsetail, and feathermoss

218—Lupine and Moosehead silt loams

Composition

Lupine and similar soils—0 to 85 percent
Moosehead and similar soils—0 to 85 percent
Contrasting inclusions—15 percent

Characteristics of the Lupine and Similar Soils

Position on landscape: Flood plains
Slope range: 0 to 3 percent
Thickness of organic mat on surface: 1 to 9 inches (3 to 23 centimeters)
Typical profile:
4 inches (10 centimeters) to 0—dark brown, slightly decomposed organic matter
0 to 3 inches (0 to 8 centimeters)—dark brown silt loam
3 to 11 inches (8 to 28 centimeters)—brown silt loam
11 to 15 inches (28 to 38 centimeters)—olive brown fine sand
15 to 60 inches (38 to 152 centimeters)—extremely gravelly sand
Drainage class: Well drained
Permeability: In the organic mat—rapid; in the medium

textured layers—moderate; in the coarse textured layers—moderately rapid
Available water capacity: Low
Depth to sand and gravel: 8 to 20 inches (20 to 51 centimeters) from the mineral soil surface
Runoff: Very slow
Depth to seasonal high water table: More than 6 feet (1.8 meters)
Hazard of erosion: By water—none if organic mat is not removed, slight if mat is removed; by wind—none if mat is not removed, severe if mat is removed
Frequency of flooding: Rare

Characteristics of the Moosehead and Similar Soils

Position on landscape: Flood plains
Slope range: 0 to 3 percent
Thickness of organic mat on surface: 2 to 8 inches (5 to 20 centimeters)
Typical profile:
5 inches (13 centimeters) to 0—dark brown, slightly decomposed organic matter
0 to 1 inch (0 to 3 centimeters)—dark grayish brown silt loam
1 inch to 30 inches (3 to 76 centimeters)—dark yellowish brown, mottled, stratified silt loam and loamy very fine sand
30 to 60 inches (76 to 152 centimeters)—variegated very gravelly sand
Drainage class: Well drained
Permeability: In the organic mat—rapid; in the medium textured layers—moderate; in the coarse textured layers—moderately rapid
Available water capacity: Low or moderate
Depth to sand and gravel: 20 to 40 inches (51 to 102 centimeters) from the mineral soil surface
Runoff: Very slow
Depth to seasonal high water table: More than 6 feet (1.8 meters)
Hazard of erosion: By water—none if organic mat is not removed, slight if mat is removed; by wind—none if mat is not removed, severe if mat is removed
Frequency of flooding: Rare

Included Areas

- Chena soils
- Salchaket soils
- Wetter soils in depressions

Major Uses

Current uses: Forestry and wildlife habitat
Potential uses: Cropland and hayland and pastureland

Major Management Factors

Elevation: 1,050 to 1,150 feet (320 to 351 meters)
Soil-related factors: Depth to sand and gravel

For more information on management, see the section "Use and Management of the Soils."

Native Vegetation

Major forest type: Spruce
Minor forest types: White spruce and spruce-paper birch
Major tree species: Black spruce and white spruce
Minor tree species: Quaking aspen and paper birch
Major understory species: Labrador tea ledum, lingonberry, bog blueberry, black crowberry, prickly rose, horsetail, and feathermoss

219—Moosehead silt loam

Composition

Moosehead and similar soils—85 percent
Contrasting inclusions—15 percent

Characteristics of the Moosehead and Similar Soils

Position on landscape: Flood plains
Slope range: 0 to 3 percent
Thickness of organic mat on surface: 2 to 8 inches (5 to 20 centimeters)
Typical profile:
5 inches (13 centimeters) to 0—dark brown, slightly decomposed organic matter
0 to 1 inch (0 to 3 centimeters)—dark grayish brown silt loam
1 inch to 30 inches (3 to 76 centimeters)—dark yellowish brown, mottled, stratified silt loam and loamy very fine sand
30 to 60 inches (76 to 152 centimeters)—extremely gravelly sand
Drainage class: Well drained
Permeability: In the organic mat—rapid; in the medium textured layers—moderate; in the coarse textured layers—moderately rapid
Available water capacity: Low or moderate
Depth to sand and gravel: 18 to 42 inches (46 to 107 centimeters) from the mineral soil surface
Runoff: Very slow
Depth to seasonal high water table: Usually more than 6 feet (1.8 meters); perched near surface in spring

Hazard of erosion: By water—none if organic mat is not removed, slight if mat is removed; by wind—none if mat is not removed, severe if mat is removed
Frequency of flooding: Rare or none

Included Areas

- Chena soils
- Beales soils
- Salchaket soils
- Wetter soils in channels

Major Uses

Current uses: Cropland, hayland and pasture, and wildlife habitat
Potential use: Forestry

Major Management Factors

Elevation: 1,050 to 1,500 feet (320 to 457 meters)
Soil-related factor: Depth to sand and gravel

For more information on management, see the section "Use and Management of the Soils."

Native Vegetation

Major forest types: Spruce and white spruce
Minor forest types: White spruce-balsam poplar, spruce-quaking aspen, and spruce-paper birch
Major tree species: Black spruce and white spruce
Minor tree species: Balsam poplar, quaking aspen, and paper birch
Major understory species: Labrador tea ledum, lingonberry, bog blueberry, black crowberry, prickly rose, horsetail, and feathermoss

220—Mosquito peat

Composition

Mosquito and similar soils—90 percent
Contrasting inclusions—10 percent

Characteristics of the Mosquito and Similar Soils

Position on landscape: Flood plains
Slope range: 0 to 1 percent
Thickness of organic mat on surface: 7 to 18 inches (18 to 46 centimeters)
Typical profile:
14 to 6 inches (36 to 15 centimeters)—dark brown, slightly decomposed peat
6 inches (15 centimeters) to 0—very dark brown, moderately decomposed silty peat
0 to 3 inches (0 to 8 centimeters)—very dark grayish brown and dark yellowish brown silt loam
3 to 60 inches (8 to 152 centimeters)—very dark grayish brown, frozen silt loam
Depth to permafrost: 2 to 25 inches (5 to 64 centimeters) from the mineral soil surface
Drainage class: Very poorly drained
Permeability: In the organic mat—rapid; in the medium textured layers—moderate; in the frozen layer—impermeable
Available water capacity: Low
Runoff: Ponded
Depth to seasonal high water table: Ponded to a depth of 1 foot (0.3 meter)
Hazard of erosion: By water—none; if organic mat is not removed, slight if mat is removed; by wind—none if mat is not removed, severe if mat is removed
Frequency of flooding: Rare or none

Included Areas

- Histosols on hummocks
- Ponded areas

Major Use

Current use: Wildlife habitat

Major Management Factors

Elevation: 1,200 to 1,300 feet (366 to 396 meters)
Soil-related factors: Wetness and permafrost

For more information on management, see the section "Use and Management of the Soils."

Native Vegetation

Major forest type: Black spruce
Major tree species: Black spruce
Minor tree species: Tamarack and white spruce
Major understory species: Labrador tea ledum, diamondleaf willow, bog blueberry, bog birch, leatherleaf, shrubby cinquefoil, lingonberry, red bearberry, cloudberry, cottonsedge, sedge, and moss

221—Riverwash

Composition

Riverwash—95 percent
Contrasting inclusions—5 percent

Characteristics of the Riverwash

Position on landscape: Flood plains

Slope range: 0 to 3 percent
Kind of material: Unvegetated silt, sand, and gravel
Frequency of flooding: Frequent

Included Areas

- Water
- Chena soils

Major Use

Current use: Wildlife habitat

Major Management Factors

Elevation: 1,000 to 1,400 feet (305 to 427 meters)
Soil-related factors: River channels that continuously migrate across the areas of Riverwash, stoniness, flooding, and low available water capacity

Native Vegetation

Major cover types in included areas: Seral herbs and willow shrub
Common plant species: Dwarf and common fireweed; sweetvetch; field oxytrope; dryas; common yarrow; willow, alder, balsam poplar, and spruce regeneration; and pioneering herbs

222—Salchaket silt loam

Composition

Salchaket and similar soils—90 percent
Contrasting inclusions—10 percent

Characteristics of the Salchaket and Similar Soils

Position on landscape: Flood plains
Slope range: 0 to 3 percent
Thickness of organic mat on surface: 0 to 6 inches (0 to 15 centimeters)
Typical profile:
3 inches (8 centimeters) to 0—black, slightly decomposed organic matter
0 to 2 inches (0 to 5 centimeters)—dark yellowish brown silt loam
2 to 3 inches (5 to 8 centimeters)—very dark brown silt loam
3 to 7 inches (8 to 18 centimeters)—brown, mottled very fine sandy loam
7 to 60 inches (18 to 152 centimeters)—light olive brown, stratified silt loam and loamy very fine sand
Drainage class: Well drained
Permeability: In the organic mat—rapid; in the medium textured layers—moderate; in the coarse textured layers (where present)—rapid
Available water capacity: Moderate
Depth to sand and gravel: 35 to 60 inches (89 to 152 centimeters) or more from the mineral soil surface
Runoff: Very slow
Depth to seasonal high water table: More than 6 feet (1.8 meters)
Hazard of erosion: By water—none if organic mat is not removed, slight if mat is removed; by wind—none if mat is not removed, severe if mat is removed
Frequency of flooding: Rare

Included Areas

- Jarvis soils
- Wetter soils in channel depressions
- Chena soils
- Occasionally flooded and frequently flooded soils
- Soils in channels that have short, steep slopes
- Gerstle soils
- Soils that have permafrost

Major Uses

Current uses: Cropland, hayland and pasture, forestry, and wildlife habitat

Major Management Factors

Elevation: 1,000 to 1,400 feet (305 to 427 meters)
Soil-related factors: Included soils in channels that have short, steep slopes, and flooding

For more information on management, see the section "Use and Management of the Soils."

Native Vegetation

Major forest types: White spruce, white spruce-balsam poplar, and white spruce-quaking aspen (fig. 3)
Minor forest types: White spruce-paper birch and black spruce
Major tree species: White spruce, balsam poplar, and quaking aspen
Minor tree species: Paper birch and black spruce
Major understory species: White spruce, white spruce-balsam poplar, and white spruce-quaking aspen forest types—prickly rose, lingonberry, horsetail, northern commandra, bunchberry dogwood, wintergreen, and feathermoss; white spruce-paper birch and black spruce forest types—Labrador tea ledum, lingonberry, bog blueberry, black crowberry, prickly rose, horsetail, and feathermoss

Figure 3.—Large white spruce trees with an understory of shcrubs, herbs, and moss on the Salchaket soil. This soil is relatively fertile.

223—Tanacross peat

Composition

Tanacross and similar soils—90 percent
Contrasting inclusions—10 percent

Characteristics of the Tanacross and Similar Soils

Position on landscape: Flood plains
Slope range: 0 to 3 percent
Thickness of organic mat on surface: 5 to 16 inches (13 to 41 centimeters)
Typical profile:
9 inches (23 centimeters) to 0—strong brown, slightly decomposed organic matter
0 to 6 inches (0 to 15 centimeters)—very dark gray silt loam
6 to 11 inches (15 to 28 centimeters)—very dark grayish brown, mottled silt loam
11 to 20 inches (28 to 51 centimeters)—very dark grayish brown, mottled, frozen silt loam
Depth to permafrost: 5 to 25 inches (13 to 64 centimeters) from the mineral soil surface in uncleared areas; more than 60 inches (152 centimeters) in cleared areas
Drainage class: Poorly drained in uncleared areas; somewhat poorly drained to moderately well drained in cleared areas
Permeability: In the organic mat—rapid; in the medium textured layers—moderate; in the frozen layer—impermeable
Available water capacity: Low in uncleared areas; high in cleared and thawed areas
Depth to sand and gravel: More than 35 inches (89 centimeters) from the mineral soil surface
Runoff: Very slow
Depth to seasonal high water table: 0 to 1 foot (0.3 meter) in uncleared areas; more than 6 feet (1.8 meters) in cleared areas
Hazard of erosion: By water—none if organic mat is not removed, slight if mat is removed; by wind—none if mat is not removed, severe if mat is removed
Frequency of flooding: Rare

Included Areas

- Soils that do not have permafrost
- Soils that have an organic mat less than 5 inches thick and have permafrost at a depth of more than 25 inches
- Mosquito soils

Major Uses

Current use: Wildlife habitat
Potential uses: Cropland and hayland and pastureland

Major Management Factors

Elevation: 1,200 to 1,500 feet (366 to 457 meters)
Soil-related factors: Wetness and permafrost

For more information on management, see the section "Use and Management of the Soils."

Native Vegetation

Major forest type: Black spruce
Major tree species: Black spruce
Minor tree species: Paper birch and white spruce
Major understory species: Labrador tea ledum, diamondleaf willow, bog blueberry, polargrass, lingonberry, black crowberry, horsetail, feathermoss, and lichen

224—Tanacross peat, terraces

Composition

Tanacross and similar soils—85 percent
Contrasting inclusions—15 percent

Characteristics of the Tanacross and Similar Soils

Position on landscape: Stream terraces
Slope range: 0 to 5 percent
Thickness of organic mat on surface: 8 to 16 inches (20 to 41 centimeters)
Typical profile:
8 inches (20 centimeters) to 0—brown, slightly decomposed organic matter
0 to 4 inches (0 to 10 centimeters)—black silt loam
4 to 16 inches (10 to 41 centimeters)—dark grayish brown and dark yellowish brown, mottled silt loam
16 to 30 inches (41 to 76 centimeters) or more—dark yellowish brown and dark grayish brown, frozen silt loam
Depth to permafrost: 5 to 17 inches (13 to 43 centimeters) from the mineral soil surface in uncleared areas; more than 60 inches (152 centimeters) in cleared areas
Drainage class: Poorly drained
Permeability: In the organic mat—rapid; in the medium textured layers—moderate; in the frozen layer—impermeable
Available water capacity: Low in uncleared areas; high in cleared and thawed areas
Runoff: Very slow

Depth to seasonal high water table: 0 to 1 foot (0.3 meter) in uncleared areas; more than 6 feet (1.8 meters) in cleared areas
Hazard of erosion: By water—none if organic mat is not removed, slight if mat is removed; by wind—none if mat is not removed, severe if mat is removed
Frequency of flooding: None

Included Areas

- Soils that do not have permafrost

Major Uses

Current use: Wildlife habitat
Potential uses: Cropland and hayland and pastureland

Major Management Factors

Elevation: 1,300 to 1,400 feet (396 to 427 meters)
Soil-related factors: Wetness and permafrost

For more information on management, see the section "Use and Management of the Soils."

Native Vegetation

Major forest type: Black spruce
Major tree species: Black spruce
Major understory species: Labrador tea ledum, diamondleaf willow, bog blueberry, polargrass, lingonberry, black crowberry, horsetail, feathermoss, and lichen

225—Tetlin silt loam, 3 to 15 percent slopes

Composition

Tetlin and similar soils—85 percent
Contrasting inclusions—15 percent

Characteristics of the Tetlin and Similar Soils

Position on landscape: Footslopes of bedrock hills
Slope range: 3 to 15 percent
Slope features: Plane to concave
Thickness of organic mat on surface: 4 to 8 inches (10 to 20 centimeters)
Typical profile:
7 inches to 1 inch (18 to 3 centimeters)—dark brown, slightly decomposed peat
1 inch (3 centimeters) to 0—light brownish gray, peat with an admixture of silt
0 to 16 inches (0 to 41 centimeters)—dark brown silt loam
16 to 60 inches (41 to 152 centimeters)—olive brown, mottled, frozen silt loam
Depth to permafrost: 5 to 30 inches (13 to 76 centimeters) from the mineral soil surface
Drainage class: Poorly drained
Permeability: In the organic mat—rapid; in the medium textured layers—moderate; in the frozen layer—impermeable
Available water capacity: Low or moderate
Runoff: Medium
Depth to seasonal high water table: 0 to 3 feet (0.9 meter)
Hazard of erosion: By water—none if organic mat is not removed, severe if mat is removed; by wind—none if mat is not removed, severe if mat is removed
Frequency of flooding: None

Included Areas

- Soils that have an organic mat more than 8 inches thick (20 centimeters), have permafrost at a shallower depth, and are on toeslopes
- Soils that are subject to occasional flooding

Major Uses

Current uses: Wildlife habitat and forestry

Major Management Factors

Elevation: 1,250 to 2,000 feet (381 to 610 meters)
Soil-related factors: Wetness, permafrost, and slope

For more information on management, see the section "Use and Management of the Soils."

Native Vegetation

Major forest type: White spruce-paper birch
Minor forest type: White spruce
Major tree species: White spruce and paper birch
Minor tree species: Balsam poplar and black spruce
Major understory species: Green alder, prickly rose, reedgrass, polargrass, horsetail, tall blueberry, lingonberry, bunchberry dogwood, wintergreen, American twinflower, and feathermoss

226—Tetlin silt loam, 15 to 50 percent slopes

Composition

Tetlin and similar soils—85 percent
Contrasting inclusions—15 percent

Characteristics of the Tetlin and Similar Soils

Position on landscape: Side slopes of bedrock hills
Slope range: 15 to 50 percent

Slope features: Plane
Thickness of organic mat on surface: 4 to 12 inches (10 to 30 centimeters)
Typical profile:
7 inches to 1 inch (18 to 3 centimeters)—dark brown, slightly decomposed peat
1 inch (3 centimeters) to 0—light brownish gray peat with an admixture of silt
0 to 16 inches (0 to 41 centimeters)—dark brown silt loam
16 to 60 inches (41 to 152 centimeters)—olive brown, mottled, frozen silt loam
Depth to permafrost: 10 to 40 inches (25 to 102 centimeters) from the mineral soil surface
Drainage class: Poorly drained
Permeability: In the organic mat—rapid; in the medium textured layers—moderate; in the frozen layer—impermeable
Available water capacity: Low or moderate
Runoff: Very rapid
Depth to seasonal high water table: 0 to 3 feet (0.9 meter)
Hazard of erosion: By water—none if organic mat is not removed, severe if mat is removed; by wind—none if mat is not removed, severe if mat is removed
Frequency of flooding: None

Included Areas

- Soils that do not have permafrost and are on south-facing slopes
- Soils in drainageways that are subject to flooding

Major Uses

Current use: Wildlife habitat
Potential use: Forestry

Major Management Factors

Elevation: 1,250 to 2,000 feet (381 to 610 meters)
Soil-related factors: Steep slopes and permafrost

For more information on management, see the section "Use and Management of the Soils."

Native Vegetation

Major forest type: White spruce-paper birch
Minor forest type: White spruce
Major tree species: White spruce and paper birch
Minor tree species: Balsam poplar and black spruce
Major understory species: Green alder, prickly rose, reedgrass, polargrass, horsetail, lingonberry, bunchberry dogwood, wintergreen, American twinflower, and feathermoss

227—Typic Eutrocryepts, bedrock substratum, 30 to 60 percent slopes

Composition

Typic Eutrocryepts and similar soils—90 percent
Contrasting inclusions—10 percent

Characteristics of the Typic Eutrocryepts and Similar Soils

Position on landscape: Shoulders and south-facing side slopes of bedrock uplands
Slope range: 30 to 60 percent
Slope features: Plane
Thickness of organic mat on surface: 0 to 7 inches (0 to 18 centimeters)
Representative profile:
5 inches to 1 inch (13 to 3 centimeters)—dark brown, slightly decomposed forest litter
1 inch (3 centimeters) to 0—light brownish gray, peaty silt loam
0 to 21 inches (0 to 53 centimeters)—dark brown silt loam
21 to 28 inches (53 to 71 centimeters)—brown and light olive brown silt loam
28 to 60 inches (71 to 152 centimeters)—bedrock weathered to gravelly coarse sand
Drainage class: Well drained to somewhat excessively drained
Permeability: In the organic mat—rapid; in the medium textured layers—moderate; in the coarse textured, weathered bedrock—moderate or rapid
Available water capacity: Very low to moderate
Depth to weathered bedrock: 10 to 45 inches (25 to 114 centimeters) from the mineral soil surface
Runoff: Rapid
Depth to seasonal high water table: More than 6 feet (1.8 meters)
Hazard of erosion: By water—none to moderate if organic mat is not removed, severe if mat is removed; by wind—none if mat is not removed, severe if mat is removed
Frequency of flooding: None

Included Areas

- Soils that have permafrost and are on footslopes
- Soils that are more gently sloping
- Rock outcrop

Major Uses

Current use: Wildlife habitat
Potential use: Forestry

Major Management Factors

Elevation: 1,250 to 2,000 feet (381 to 610 meters)
Soil-related factors: Steep slopes and depth to bedrock

For more information on management, see the section "Use and Management of the Soils."

Native Vegetation

Major forest types: White spruce and white spruce-quaking aspen
Minor forest types: Quaking aspen and white spruce-paper birch
Major tree species: White spruce and quaking aspen
Minor tree species: Paper birch and balsam poplar
Major understory species: White spruce and white spruce-paper birch forest types—prickly rose, reedgrass, horsetail, lingonberry, bunchberry dogwood, American twinflower, and feathermoss; white spruce-quaking aspen and quaking aspen forest types—prickly rose, russet buffaloberry, highbush cranberry, various grasses, kinnikinnick, northern commandra, and American twinflower

228—Typic Eutrocryepts, sandy substratum, 20 to 45 percent slopes

Composition

Typic Eutrocryepts, sandy substratum, and similar soils—90 percent
Contrasting inclusions—10 percent

Characteristics of the Typic Eutrocryepts, Sandy Substratum, and Similar Soils

Position on landscape: Side slopes of bedrock hills
Slope range: 20 to 45 percent
Slope features: Plane
Thickness of organic mat on surface: 1 to 5 inches (3 to 13 centimeters)
Representative profile:
3 inches (8 centimeters) to 0—dark brown, moderately decomposed organic matter
0 to 18 inches (0 to 46 centimeters)—brown and dark yellowish brown silt loam
18 to 50 inches (46 to 127 centimeters)—dark grayish brown fine sand
50 to 60 inches (127 to 152 centimeters)—weathered bedrock
Drainage class: Well drained
Permeability: In the organic mat—rapid; in the medium textured layers—moderate; in the coarse textured layers—moderately rapid
Available water capacity: Moderate
Depth to fine sand: 14 to 35 inches (36 to 89 centimeters) from the mineral soil surface
Depth to bedrock: 30 to 60 inches (76 to 152 centimeters) or more from the mineral soil surface
Runoff: Rapid
Depth to seasonal high water table: More than 6 feet (1.8 meters)
Hazard of erosion: By water—none if organic mat is not removed, severe if mat is removed; by wind—none if mat is not removed, severe if mat is removed
Frequency of flooding: None

Included Areas

- Soils on footslopes that have permafrost and have slopes of less than 20 percent

Major Uses

Current use: Wildlife habitat
Potential use: Forestry

Major Management Factors

Elevation: 1,250 to 2,000 feet (381 to 610 meters)
Soil-related factor: Slope

For more information on management, see the section "Use and Management of the Soils."

Native Vegetation

Major forest type: Paper birch
Minor forest type: White spruce-paper birch
Major tree species: Paper birch and white spruce
Major understory species: Prickly rose, highbush cranberry, willow, reedgrass, horsetail, tall bluebells, and American twinflower

229—Typic Eutrocryepts, steep

Composition

Typic Eutrocryepts and similar soils—85 percent
Contrasting inclusions—15 percent

Characteristics of the Typic Eutrocryepts and Similar Soils

Position on landscape: Slopes, shoulders, and crests of glacial moraines
Slope range: 0 to 35 percent

Thickness of organic mat on surface: 1 to 7 inches (3 to 18 centimeters)
Representative profile:
2 inches (5 centimeters) to 0—very dark brown, slightly decomposed organic matter
0 to 4 inches (0 to 10 centimeters)—very dark brown silt loam
4 to 34 inches (10 to 86 centimeters)—dark brown silt loam
34 to 56 inches (86 to 142 centimeters)—dark grayish brown fine sand
56 to 60 inches (142 to 152 centimeters)—light yellowish brown very cobbly sandy loam
Drainage class: Well drained
Permeability: In the organic mat—rapid; in the medium textured layers—moderate; in the coarse textured layers—moderately rapid
Available water capacity: Moderate
Depth to sand, gravel, or cobbles: 10 to 35 inches (25 to 89 centimeters) from the mineral soil surface
Runoff: Rapid
Depth to seasonal high water table: More than 6 feet (1.8 meters)
Hazard of erosion: By water—none if organic mat is not removed, severe if mat is removed; by wind—none if mat is not removed, severe if mat is removed
Frequency of flooding: None

Included Areas

- Wetter soils that have permafrost and are on north-facing slopes in depressions
- Wetter soils that do not have permafrost and are in depressions
- Beales soils

Major Uses

Current use: Wildlife habitat
Potential use: Forestry

Major Management Factors

Elevation: 1,300 to 1,800 feet (396 to 549 meters)
Soil-related factors: Slope and depth to sand and gravel

For more information on management, see the section "Use and Management of the Soils."

Native Vegetation

Major forest types: Paper birch and paper birch-white spruce
Minor forest types: Spruce-quaking aspen and black spruce
Major tree species: Paper birch and white spruce
Minor tree species: Black spruce and quaking aspen
Major understory species: Paper birch and paper birch-white spruce forest types—prickly rose, reedgrass, horsetail, lingonberry, bunchberry dogwood, American twinflower, and feathermoss; spruce-quaking aspen and black spruce forest types—Labrador tea ledum, prickly rose, lingonberry, northern commandra, and feathermoss

230—Typic Eutrocryepts-Typic Histoturbels complex, steep

Composition

Typic Eutrocryepts and similar soils—30 to 75 percent
Typic Histoturbels and similar soils—20 to 65 percent
Contrasting inclusions—15 percent

Characteristics of the Typic Eutrocryepts and Similar Soils

Position on landscape: Crests, shoulders, and backslopes of glacial moraines
Slope range: 0 to 35 percent
Slope features: Convex to plane
Thickness of organic mat on surface: 1 to 5 inches (3 to 13 centimeters)
Representative profile:
2 inches (5 centimeters) to 0—very dark grayish brown, slightly decomposed organic matter
0 to 25 inches (0 to 64 centimeters)—dark yellowish brown, mottled silt loam
25 to 38 inches (64 to 97 centimeters)—grayish brown silt loam
38 to 60 inches (97 to 152 centimeters)—light olive brown extremely cobbly sandy loam
Drainage class: Well drained
Permeability: In the organic mat—rapid; in the medium textured layers—moderate; in the coarse textured layers—moderately rapid
Available water capacity: Moderate or high
Depth to sand, gravel, and cobbles: 10 to 40 inches (25 to 102 centimeters) from the mineral soil surface
Runoff: Rapid
Depth to seasonal high water table: More than 6 feet (1.8 meters)
Hazard of erosion: By water—none if organic mat is not removed, severe if mat is removed; by wind—none if mat is not removed, severe if mat is removed
Frequency of flooding: None

Characteristics of the Typic Histoturbels and Similar Soils

Position on landscape: Backslopes, footslopes, and depressions on glacial moraines
Slope range: 0 to 20 percent
Slope features: Concave
Thickness of organic mat on surface: 4 to 12 inches (10 to 30 centimeters)
Representative profile:
8 inches (20 centimeters) to 0—dark brown, slightly decomposed organic matter
0 to 7 inches (0 to 18 centimeters)—dark brown mucky silt loam
7 to 12 inches (18 to 30 centimeters)—dark grayish brown, mottled silt loam
12 to 60 inches (30 to 152 centimeters)—dark grayish brown, mottled, frozen silt loam
Depth to permafrost: 0 to 30 inches (0 to 76 centimeters) from the mineral soil surface
Drainage class: Poorly drained
Permeability: In the organic mat—rapid; in the medium textured layers—moderate; in the frozen layer—impermeable
Available water capacity: Low
Runoff: Medium
Depth to seasonal high water table: 0 to 1 foot (0.3 meter)
Hazard of erosion: By water—none if organic mat is not removed, moderate if mat is removed; by wind—none if mat is not removed, severe if mat is removed
Frequency of flooding: None

Included Areas

- Soils that have a thinner layer of loamy material over a cobbly substratum
- Soils that have short slopes of more than 35 percent
- Wet soils that do not have permafrost and are in depressions

Major Uses

Current use: Wildlife habitat
Potential use: Forestry

Major Management Factors

Elevation: 1,300 to 1,800 feet (396 to 549 meters)
Soil-related factors: Wetness and permafrost (Typic Histoturbels); depth to sand, gravel, and cobbles (Typic Eutrocryepts)

For more information on management, see the section "Use and Management of the Soils."

Native Vegetation (Typic Eutrocryepts)

Major forest types: Paper birch-white spruce and paper birch
Minor forest types: White spruce, white spruce-balsam poplar, and spruce-quaking aspen
Major tree species: Paper birch and white spruce
Minor tree species: Balsam poplar, black spruce, and quaking aspen
Major understory species: Paper birch-white spruce, paper birch, white spruce, and white spruce-balsam poplar forest types—prickly rose, reedgrass, horsetail, lingonberry, bunchberry dogwood, American twinflower, and feathermoss; spruce-quaking aspen forest type—Labrador tea ledum, prickly rose, lingonberry, northern commandra, and feathermoss

Native Vegetation (Typic Histoturbels)

Major forest type: Black spruce
Minor forest type: Black spruce-paper birch
Major tree species: Black spruce
Minor tree species: Paper birch, white spruce
Major understory species: Labrador tea ledum, bog birch, polargrass, lingonberry, black crowberry, sedge, cloudberry, moss

231—Typic Eutrocryepts-Typic Aquorthels complex, steep

Composition

Typic Eutrocryepts and similar soils—30 to 60 percent
Typic Aquorthels and similar soils—30 to 60 percent
Contrasting inclusions—15 percent

Characteristics of the Typic Eutrocryepts and Similar Soils

Position on landscape: Crests, shoulders, and backslopes of glacial moraines
Slope range: 0 to 50 percent
Slope features: Convex to plane
Thickness of organic mat on surface: 1 to 5 inches (3 to 13 centimeters)
Representative profile:
2 inches (5 centimeters) to 0—very dark grayish brown, slightly decomposed organic matter
0 to 4 inches (0 to 10 centimeters)—dark brown silt loam
4 to 50 inches (10 to 127 centimeters)—dark yellowish brown silt loam

50 to 60 inches (127 to 152 centimeters)—variegated extremely cobbly sandy loam
Drainage class: Well drained
Permeability: In the organic mat—rapid; in the medium textured layers—moderate; in the coarse textured layers—moderately rapid
Available water capacity: High
Depth to sand, gravel, and cobbles: 15 to 60 inches (38 to 152 centimeters) or more from the mineral soil surface
Runoff: Rapid
Depth to seasonal high water table: More than 6 feet (1.8 meters)
Hazard of erosion: By water—none if organic mat is not removed, severe if mat is removed; by wind—none if mat is not removed, severe if mat is removed
Frequency of flooding: None

Characteristics of the Typic Aquorthels and Similar Soils

Position on landscape: Backslopes and toeslopes of moraines
Slope range: 0 to 40 percent
Slope features: Concave to straight
Thickness of organic mat on surface: 2 to 6 inches (5 to 15 centimeters)
Representative profile:
3 inches (8 centimeters) to 0—dark brown, slightly decomposed organic matter
0 to 9 inches (0 to 23 centimeters)—dark brown, peaty silt loam
9 to 33 inches (23 to 84 centimeters)—dark grayish brown, mottled silt loam
33 to 60 inches (84 to 152 centimeters)—dark gray, mottled, frozen silt loam
Depth to permafrost: 24 to 55 inches (61 to 140 centimeters) from the mineral soil surface
Drainage class: Poorly drained
Permeability: In the organic mat—rapid; in the medium textured layers—moderate; in the frozen layer—impermeable
Available water capacity: Moderate or high
Runoff: Rapid
Depth to seasonal high water table: 0 to 3 feet (0.9 meter)
Hazard of erosion: By water—none if organic mat is not removed, severe if mat is removed; by wind—none if mat is not removed, severe if mat is removed
Frequency of flooding: None

Included Areas

- Soils that have permafrost and have an organic mat more than 8 inches thick (20 centimeters) on the surface
- Wet soils that do not have permafrost and are in depressions

Major Uses

Current use: Wildlife habitat
Potential use: Forestry

Major Management Factors

Elevation: 1,300 to 1,800 feet (396 to 549 meters)
Soil-related factors: Steep slopes; wetness and permafrost (Typic Aquorthels); depth to sand, gravel, and cobbles (Typic Eutrocryepts)

For more information on management, see the section "Use and Management of the Soils."

Native Vegetation (Typic Eutrocryepts)

Major forest types: Paper birch and paper birch-white spruce
Minor forest types Paper birch-balsam poplar
Major tree species: Paper birch and white spruce
Minor tree species: Black spruce and balsam poplar
Major understory species: Prickly rose, reedgrass, horsetail, lingonberry, bunchberry dogwood, American twinflower, and feathermoss

Native Vegetation (Typic Aquorthels)

Major forest types: Paper birch and paper birch-white spruce
Minor forest type: Spruce-paper birch
Major tree species: Paper birch and white spruce
Minor tree species: Black spruce
Major understory species: Green alder, Labrador tea ledum, prickly rose, horsetail, reedgrass, lingonberry, bunchberry dogwood, and feathermoss

232—Volkmar silt loam

Composition

Volkmar and similar soils—85 percent
Contrasting inclusions—15 percent

Characteristics of the Volkmar and Similar Soils

Position on landscape: Stream terraces
Slope range: 0 to 3 percent

Thickness of organic mat on surface: 3 to 8 inches (8 to 20 centimeters)
Typical profile:
7 inches to 1 inch (18 to 3 centimeters)—dark brown, slightly decomposed organic matter
1 inch (3 centimeters) to 0—black muck
0 to 2 inches (0 to 5 centimeters)—dark brown and dark gray, mottled silt loam
2 to 26 inches (5 to 66 centimeters)—dark brown and dark gray, mottled silt loam
26 to 60 inches (66 to 152 centimeters)—variegated extremely gravelly sand
Drainage class: Moderately well drained
Permeability: In the organic mat—rapid; in the medium textured layers—moderate; in the coarse textured layers—moderately rapid
Available water capacity: Low or moderate
Depth to sand, gravel, and cobbles: 12 to 33 inches (30 to 84 centimeters) from the mineral soil surface
Runoff: Very slow
Depth to seasonal high water table: Usually more than 6 feet (1.8 meters), but perched near surface in spring
Hazard of erosion: By water—none if organic mat is not removed, slight if mat is removed; by wind—none if mat is not removed, severe if mat is removed
Frequency of flooding: None

Included Areas

- Wetter soils that have permafrost
- Chena soils
- Soils that are subject to rare flooding

Major Uses

Current uses: Forestry, cropland, hayland and pastureland, and wildlife habitat

Major Management Factors

Elevation: 1,300 to 1,500 feet (396 to 457 meters)
Soil-related factors: Depth to sand, gravel, and cobbles and restricted available water capacity

For more information on management, see the section “Use and Management of the Soils.”

Native Vegetation

Major forest types: Black spruce and black spruce-quaking aspen
Major tree species: Black spruce and quaking aspen
Minor tree species: White spruce
Major understory species: Labrador tea ledum, lingonberry, bog blueberry, blueberry willow, feathermoss, and lichen

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavior characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as rangeland and woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreation facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Planning for specific farms and other areas should be based on the information given in the section "Detailed Soil Map Units" and on onsite evaluation. Specific information on current conservation practices for various land uses can be obtained from the local office of the Natural Resources Conservation Service or the Alaska Cooperative Extension.

Crops and Pasture

By Gary Champlin, former district conservationist, Delta Junction, Alaska.

Agronomy Practices

The row crops best suited to the survey area are frost-hardy vegetables such as cabbage, Brussels sprouts, broccoli, cauliflower, lettuce, potatoes, and carrots. Adapted small grains include barley and oats (fig. 4). The best suited perennial grasses for use as hay and pasture include smooth brome, timothy, red fescue, creeping foxtail, and Kentucky bluegrass. These grasses also can be grown for seed production. Wheat, rye, faba beans, peas, canola, buckwheat, annual ryegrass, and some clovers have been grown with limited success. Use of proper varieties of these plants increases the success rate. The local office of the Alaska Cooperative Extension can provide the latest recommendations.

The soils in the survey area lack natural fertility; thus, proper amounts of fertilizer need to be applied for good production. Applications of nitrogen, phosphate, potash, and sulfur are needed for most crops. Extra nitrogen is needed in newly cleared areas to allow soil micro-organisms to decompose plant residue and other organic matter. Current recommended rates of fertilization, given as actual pounds per acre of nitrogen, phosphate (P2O5), potash (K2O), and sulfur, respectively, are 75-50-20-10 for small grain, 60-60-30-10 for establishing grasses, 120-60-30-10 for hay production, and 160-240-160-20 for vegetables such as potatoes.

For the greatest success, soils should be tested yearly to determine fertilization needs. The Alaska Cooperative Extension can assist with fertilization suggestions and with soil tests. Fertilizer should be applied at a rate that allows for efficient use of nutrients by plants while minimizing the loss of fertilizer as a result of surface runoff and leaching.

In some years it may be desirable to apply pesticides to control weeds, insects, and plant diseases. The Alaska Cooperative Extension can provide information on pesticides registered for use for

Figure 4.— Barley field in the survey area. A windrow of debris from land clearing, native spruce forest, and the Yukon-Tanana Uplands are in background.

each crop and pest. Pesticides should be applied according to the directions on the individual labels. Care should be taken to control the drift of pesticides and the movement of pesticides by surface runoff or by groundwater.

Continuous cultivation tends to deteriorate soil tilth. Applying manure and green manure crops and incorporating crop residue into the soil help to maintain soil tilth.

The amount of moisture received generally is adequate for crops adapted to the growing season; however, a lack of precipitation in spring often results in soil moisture deficits early in summer, which may retard crop emergence and development. Cool, wet weather late in summer may delay crop maturation and harvest.

Conservation Practices

Arable soils in the survey area have yearly soil loss tolerances of 1 to 5 tons per acre. Careful soil management and use of conservation practices are needed to maintain long-term soil productivity. All of the soils in the area are subject to erosion if the native vegetation is removed. Soils that have slopes of more than 12 percent should not be cleared of native vegetation.

Because the survey area is subject to strong winds from the south and southeast, control of wind erosion is critical for most of the soils in the area. Windbreaks located at right angles to the prevailing wind should be maintained when clearing land. If windbreaks are spaced further than 330 feet apart, other practices such as proper crop selection, use of crop residue, conservation tillage, use of grass barriers, and stripcropping are needed. When planning windbreaks, the need to control wind erosion should be considered a higher priority than large field size. Soils that are subject to an extreme hazard of erosion need to be planted to permanent hay or pasture.

Water erosion is a hazard for soils that are strongly sloping and those that have short, steep slopes and are along channel depressions. Soils that have slopes of 7 to 12 percent should be used only for hay and pasture. Soils that have slopes of less than 7 percent can be cultivated, but a conservation system should be applied. Suitable conservation practices include contour cropping, conservation tillage, and use of crop residue. Grassed waterways may be needed in areas of concentrated flow to prevent the formation of gullies.

Preserving the quality of both groundwater and surface water should be considered when developing a conservation system. Suitable practices include nutrient management, pesticide management, use of

filter strips, use of sediment basins, and waste management.

Some areas of the soils in the survey area are considered wetlands. These should be identified and maintained as wetland areas. Development of wetlands is regulated by the Federal government; thus, landowners should contact the local office of the Natural Resources Conservation Service for information on a specific site.

Land Clearing

Land clearing is the initial operation in the development of land for agricultural areas, homesites, roads, and other land uses. Some large areas of the survey area have been cleared for agricultural production. Proper clearing can significantly influence the success of the development.

It may take 4 to 6 years to completely clear and remove the berm piles, which are rows of trees, stumps, and brush, from a large agricultural field. For small areas, such as those used as homesites, this material can be loaded into a truck and hauled off the site in a relatively short period of time.

Proper land clearing requires careful planning. It may be desirable to harvest timber before clearing or to salvage timber after clearing. Many areas have trees that are valuable for use as poles, posts, lumber, and firewood. An effort should be made to harvest this valuable resource if economically feasible. The drainage patterns of a field should be considered prior to clearing. Berm piles can act as diversions for surface water. Windbreaks should be maintained to control wind erosion on fields and to protect homes and roads from drifting snow. The location of windbreaks should be identified at the time of clearing. Greenbelts and filter strips should be maintained along watercourses, streams, springs, ponds, and wetland areas. Open burning is strictly regulated, and permits from the Alaska Division of Forestry and the Department of Environmental Conservation are required. These agencies should be contacted prior to clearing so that the guidelines of the permit can be met and so that the berm piles can be constructed to allow for a safe and efficient burn.

Soils that have permafrost should be cleared only after onsite investigation. After the organic mat is removed in the land clearing process, the permafrost will begin to thaw and release water. For the soils to drain properly, the excess water must have an outlet. Soils that have slopes of more than 3 percent usually have adequate drainage. Soils that are nearly level may not drain adequately because of the concave areas or a lack of suitable outlets. Whether the soils will drain adequately or not cannot always be determined by onsite investigation. After clearing, time is needed to allow the soils to thaw and drain before beginning field operations. The amount of time needed varies and cannot be predicted.

The first step in land clearing is to fell the trees by pulling a heavy anchor chain between two bulldozers. The chain is allowed to form a large loop between the bulldozers. Sometimes a large weight is attached to the middle of the loop to keep the chain from riding too high on the trees. The best results are obtained if traction trails are cut through the timber with a bulldozer and blade prior to chaining. Cleared material is stacked in windrows, called berm piles, on the top of these trails. To minimize puddling and compaction, chaining should be done when the soils are not saturated. Chaining after the soils freeze in fall is effective in most areas.

After chaining, the next step is to shear the organic material from the mineral soil surface and to stack the material into berm piles. For the greatest efficiency, use the largest bulldozers available. Shearing and stacking are best suited early in spring, after most of the snow has melted but before the soils thaw. Including mineral soil material in the berm piles inhibits disposal and burning and thus should be avoided.

After stacking the berm piles, the ground is worked with a large breaking disk to destroy roots and incorporate organic material into the mineral soil. A root rake is then used to collect the roots, stumps, and other material into small windrows, which are then raked in succeeding passes into the berm piles. This may need to be repeated several times, and some hand picking of sticks may be required to completely clean up the fields. Because the soils are very prone to wind and water erosion after this step, conservation practices such as use of cover crops may be needed if the fields will not be planted within one growing season.

The final step is removal of the berm piles. These piles usually are left to dry for as long as 1 year, and then they are burned. The piles are then restacked and burned again. This process is repeated until the remaining material can be hauled away, buried, or disposed of in some other way.

Yields per Acre

Table 5 shows the average yields per acre that can be expected of the principal crops under a high level of management. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors.

The yields are based mainly on the experience and records of farmers, conservationists, and extension

agents. Available yield data from producing farms and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting to ensure the smallest possible loss.

For yields of irrigated crops, it is assumed that the irrigation system is adapted to the soils and to the crops grown, that good-quality irrigation water is uniformly applied as needed, and that tillage is kept to a minimum.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The relative productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in the table are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Natural Resources Conservation Service or of the Alaska Cooperative Extension can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

The land capability classification for each map unit is given in table 5. Land capability classification shows, in a general way, the suitability of soils for most field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, woodland, and engineering purposes.

In the capability system, soils generally are grouped at three levels—capability class, subclass, and unit. Only class and subclass are used in this survey.

Capability classes, the broadest groups, are designated by numerals 1 through 8. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class 1 soils have few limitations that restrict their use. There are no class 1 soils in Alaska because of the low soil temperatures.

Class 2 soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class 3 soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class 4 soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class 5 soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class 6 soils have severe limitations that make them generally unsuitable for cultivation.

Class 7 soils have very severe limitations that make them unsuitable for cultivation.

Class 8 soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a capital letter, *E, W, S,* or *C,* to the class numeral, for example, 2E. The letter *E* shows that the main hazard is the risk of erosion unless a close-growing plant cover is maintained; *W* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *S* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *C,* used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

There are no subclasses in class 1 because the soils of this class have few limitations. Class 5 contains only the subclasses indicated by *W, S,* or *C* because the soils in class 5 are subject to little or no erosion. They have other limitations that restrict their use mainly to pasture, rangeland, woodland, wildlife habitat, or recreation.

Forestry

By Darrell Kautz, plant ecologist, Palmer, Alaska.

Forestry historically has been only a minor land use in the survey area, but it has been relatively steady for

many years. Small-scale, selective logging has occurred in many areas of suitable timber. Normally, only large-diameter, high-quality white spruce and some paper birch have been cut. Small trees, trees with defects, and the other species have been left standing. A locally owned and operated mill on Cummins Road processes logs into rough dimensional lumber and house logs for local use.

Approximately 24,000 acres (9,720 hectares) of forest land in the area was cleared in the late 1970's and early 1980's in conjunction with the Delta II Agriculture Project. State-mandated development schedules did not allow for using the timber resources during the majority of the land clearing operations. Instead, trees and other forest vegetation were pushed by heavy equipment into windrows and berms for later burning. A large proportion of the cleared land never was put into production, and other acreages were planted to tame grasses and later either abandoned or put into the Conservation Reserve Program. The land that was abandoned currently supports early-successional plant communities that consist dominantly of dense, tall shrubs and tree regeneration. Common species include various willows, alder, prickly rose, currant, paper birch, quaking aspen, white spruce, black spruce, and a variety of seral herbs (see Appendix). Land that was planted to grasses is regenerating to forests more slowly. Scattered tree regeneration and alder have invaded the areas covered by grass, particularly those areas adjacent to forests and where grass cover is thin and not particularly vigorous. Old windrows and berms support dense stands of prickly rose, currant and other shrubs, a variety of herbs, and tree regeneration.

All of the trees growing in the area are valuable for use as wood products. White spruce is well suited to dimensional lumber for millwork and general construction purposes, can be used for posts and poles, and provides average-quality fuelwood. Balsam poplar is suitable for use as roughcut lumber and as core stock for plywood. Tall, large-diameter white spruce and balsam poplar trees make excellent house logs unless they are damaged by heart rot. Quaking aspen is suited to small-dimension lumber products used in paneling and cabinetry. Cottonwood and quaking aspen provide marginal-quality fuelwood. Paper birch is well suited to use as veneer and small-dimension lumber for manufacturing furniture, paneling, and flooring, and it provides high-quality fuelwood. Black spruce and tamarack are best suited to use as posts and poles. As fuelwood, black spruce is comparable to white spruce. Tamarack is an excellent source of firewood.

The most productive forested soils in the area are those that are moderately deep or deep, are well drained, and are on flood plains, stream terraces, moraines, and bedrock hills. These include the Jarvis (unit 213), Salchaket (unit 222), Moosehead (unit 219), and Gerstle (unit 208) soils and the Cryofluvents (unit 206) and Typic Eutrocryepts (units 227 through 231). These soils are well suited to use as forest land. The estimated productivity of white spruce on these soils ranges from 33 to 37 cubic feet of wood per acre per year (2.3 to 2.6 cubic meters per hectare per year) when yields are calculated at the culmination of the mean annual increment (CMAI). At present, the forest cover in most areas of these soils, except for those areas previously cleared for agriculture, is dominantly mixed stands of white spruce, paper birch, and balsam poplar.

Soils that have somewhat lower productivity, but still are suited to use as forest land, are those that are shallow, are well drained, and are on flood plains and stream terraces. These include the Jarvis (unit 212), Lupine (units 217 and 218), and Volkmar (unit 232) soils. The estimated productivity of white spruce at CMAI on these soils ranges from 24 to 26 cubic feet of wood per acre per year (1.7 to 1.8 cubic meters per hectare per year). The forest cover on these soils is composed primarily of white spruce, black spruce, and quaking aspen. Paper birch also is common in many stands.

Soil surveys are becoming increasingly important to forest land owners and managers as they seek ways to improve the productivity and management of their land and to plan the most efficient use of forest resources. Tables 6, 7, and 8 summarize the forestry information for this soil survey. These tables can serve as quick references for important soils interpretations for forestry. The methods and procedures used by foresters and soil scientists to obtain the information are in the National Soil Survey Handbook (USDA, 1996), the National Forestry Manual (USDA, n.d.), and applicable state supplements.

Forest Land Productivity

Table 6 shows, for each forested soil, the commonly grown trees. *Common trees* are species that generally grow on the soil, regardless of economic importance. *Site index* is the average height, in feet, that dominant and codominant trees attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. The specified number of years, or base age, varies for different tree species. Site index is determined from height and age measurements of selected trees in stands throughout the survey area. Forest researchers

have developed tables and equations for use in determining site index for each tree species. Site index is comparative and an approximate measure of height growth, not an absolute or expected value. The most rapid tree growth and greatest yields of a particular tree species can be expected on soils with the highest site indexes.

Site index values can be converted into estimated yields by using yield tables published with the site index tables and equations (Farr, 1967; Gregory and Haack, 1965). Under the column *cubic feet*, the maximum average annual volume growth of the stand, in cubic feet per acre per year, is listed. This peak volume growth is referred to as the culmination of the mean annual increment (CMAI). The age of the stand at which this volume growth occurs varies according to the species and the site index. Actual yields and existing stand volume, however, varies from stand to stand and must be measured onsite.

Productivity class denotes potential productivity of forest overstory tree species based on the site index and the corresponding CMAI. The larger the number, the greater the potential productivity. The productivity class is determined by converting the CMAI volume from cubic feet per acre per year to cubic meters per hectare per year. Productivity class 1 indicates a growth potential of 1 cubic meter of wood per hectare per year (14.3 cubic feet per acre per year); productivity class 2, a potential of 2 cubic meters per hectare per year (28.6 cubic feet per acre per year); and so on.

Forest Land Management

Table 7 shows, for each forested soil, the *ordination symbol* and *management concerns*. The ordination symbol is based on a uniform system for classifying individual soils and groups of soils that have similar forest productivity, use, and management. All of the soils that have the same ordination symbol have about the same potential productivity and require the same general kinds of management.

The first element of the ordination symbol, a number, is the productivity class for the indicator species. The indicator species is usually the major tree species that has the highest potential productivity on a particular soil.

The second element of the ordination symbol, a capital letter, is a subclass that indicates certain soil or physiographic characteristics that contribute to the hazards and limitations to forest management. The letter *R* indicates steep slopes; *X* indicates stones or rocks on or in the soil; *W* indicates excessive water in or on the soil; *D* indicates limited rooting depth; *C* indicates clay in the upper part of the soil profile; *S* indicates dry, sandy soils; and *F* indicates fragmental or skeletal soils. The letter *A* indicates few, if any, limitations or restrictions.

The soils are rated in the table for a number of factors to be considered in use and management. *Slight, moderate,* and *severe* are used to indicate the degree of the major soil limitations. A rating of *slight* indicates that no additional measures are needed other than the normal procedures used locally in forest management. A rating of *moderate* or *severe* indicates that special measures or conservation practices designed to overcome the limitations may be needed.

Erosion hazard ratings refer to the risk of water erosion and soil loss on a noncompacted, bare soil surface for 2 to 5 years following a major ground disturbance. A rating of *slight* indicates that the expected soil loss is minimal and of no consequence to long-term potential productivity; *moderate*, that measures are needed to control erosion during road construction and timber harvesting to prevent site degradation; and *severe*, that intensive management or special equipment and methods are needed to prevent excessive soil erosion.

Water erosion results when a bare soil surface is disturbed by the impact of raindrops and by runoff, detaching soil particles and carrying them downslope. As the gradient and length of the slope increase, the velocity and volume of runoff increase and the erosion hazard also increases. Soils that have a high amount of silt and fine sand, a low amount of organic matter, weak structure, and slow permeability are susceptible to erosion. Saturated soil conditions, which occur as the seasonal frost thaws late in spring, also increase the risk of erosion. Maintaining adequate plant cover, developing water management structures, and avoiding disturbance of the soil surface, particularly when soils are saturated, can minimize the risk of erosion.

Equipment limitation ratings refer to the operability and use of wheeled and tracked equipment. A rating of *slight* indicates that normally the kind of equipment and the season of use are not restricted by soil factors; *moderate* indicates that equipment use is restricted because of slope, seasonal wetness, flooding, or some other factor; and *severe* indicates a need for special equipment, a hazard in using equipment, or a longer seasonal limitation.

Slope is the most obvious limitation to the use of equipment. As the slope increases, the operability of wheeled equipment becomes restricted and tracked equipment must be used. On the steepest slopes, tracked equipment cannot be operated safely so more sophisticated harvesting systems must be used. Soil wetness can limit the use of equipment even in level

and gently sloping areas, especially in areas where the surface texture is silty, sandy, or organic. In addition to the risk of equipment getting stuck in mud, severe soil disturbance by equipment contributes to soil erosion and reduced water quality. Other soil factors that limit the use of equipment include surface bedrock and rock fragments and cobbly and stony surface textures.

Seedling mortality ratings refer to the probability of death of naturally established or properly planted tree seedlings as influenced by soil properties. A rating of *slight* indicates that seedling mortality is not expected to be a problem under normal conditions. A rating of *moderate* indicates that some problems can be expected. Extra precautions are advisable. A rating of *severe* indicates that the rate of mortality will be high. Extra precautions are essential for successful reforestation. Plant competition, an adequate seed source, and the quality of site preparations are not considered in the ratings. These factors, however, may be more important to successful reforestation than the soil properties that affect seedling mortality.

Excessive soil wetness, because of a high water table or saturated soil conditions, is a major factor contributing to seedling mortality. Seedlings in wet soils also may be susceptible to frost heaving during periods of diurnal freeze-thaw cycles, particularly at the higher elevations. Soil droughtiness because of the low available water capacity of coarse-textured soils and the high amount of coarse fragments in some soils also contributes to seedling mortality. The mortality problems associated with soil droughtiness are greater in convex positions such as ridges and shoulder slopes. Restricted rooting depth because of bedrock, contrasting layers, or compacted layers also contributes to seedling mortality. Special site preparation, larger seedling stock, or reinforcement plantings may be needed on soils that have a seedling mortality rating of moderate or severe.

Windthrow hazard ratings take into consideration the soil characteristics that affect the development of tree roots and the ability of the soil to hold trees firmly. Windthrow hazard is highly variable and depends largely on the frequency and duration of strong winds, the amount of turbulence and wind funneling as a result of the topography, orographic effects, tree cutting boundaries, and the height and density of the trees.

In Alaska, low soil temperatures and soil wetness restrict root growth. The supporting roots of all tree species typically are concentrated in the upper horizons of the soils. Shallow depth to bedrock also restricts roots, although in many soils, fractures in the bedrock allow for the anchoring of roots. Because of the restricted rooting characteristics of the trees in Alaska, a rating of slight is not used. A rating of *moderate* indicates that an occasional tree may be blown down during periods of moderate or strong winds, and a rating of *severe* indicates that many trees may be blown down during such periods. Management of soils that have a moderate or severe rating requires more caution in thinning operations; more attention to wind occurrence, direction, and speed when designing timber sales and cuts; and contingency plans for periodic salvage of windthrown trees.

Plant competition ratings refer to the likelihood of invasion or growth of understory plants that would inhibit reforestation and stand development following logging or other soil disturbances. The rating is highly variable and depends on the occurrence and proximity of competitive species. The rating also assumes that seed dispersal or planting on the soil occurs within 3 to 5 years following disturbance. A rating of *slight* indicates that understory plants are not likely to delay reforestation and that natural or planted seedlings can develop without undue competition; *moderate* indicates that plant competition will delay natural or planted reforestation; and *severe* indicates that competition can prevent the establishment of a new forest suitable for tree crop production unless precautionary measures are taken.

Favorable climate and soil moisture characteristics contribute to rapid and lush growth or invasion of understory plants. Sources of competing vegetation include sprouting of existing plants, spread of plants from adjacent areas, and germination of new seed. A rating of moderate or severe indicates the need for careful consideration of the occurrence and competitiveness of understory vegetation during planning, logging, site preparation, and reforestation. Biological, mechanical, or chemical treatment may be needed to retard the growth of undesirable plants. In areas where the competing vegetation is bluejoint reedgrass, intensive cattle grazing for a few years can reduce the cover of grass and mulch and create a suitable seedbed for trees.

Forest Roads

Table 8 shows, for each soil, the limitations and hazards for primitive roads and skid trails. Primitive roads and skid trails are unsurfaced roads and trails constructed directly across the soil surface with minimal clearing and grading and without adding subgrade fill or surfacing. The organic material and some mineral soil material may be removed or disturbed during construction. Normally, these roads and trails receive relatively low intensity use for short

durations. Only the upper 10 inches (25 centimeters) of the soil is considered in the ratings.

Moderate slope is defined as slopes of 15 to 30 percent; *steep slope*, 30 to 50 percent; and *very steep slope*, more than 50 percent. Soils that have very steep slopes are considered unsuited to primitive roads; therefore, additional limitations and hazards are not listed for these soils.

Flooding is a limitation if the soils are subject to occasional or frequent flooding. The source of floodwater is usually stream overflow, but it may also be runoff or tidewater.

Wetness is a limitation if the soils are poorly drained or very poorly drained; however, even soils with good dranage may be wet following snowmelt in spring and during rainy periods.

Low strength is a limitation if the soils, under certain conditions, are not strong enough to support loads because of low resistance to deformation and low bearing strength. *Low strength, organics,* indicates that the hazard or limitation is primarily the result of a thick layer of organic material on the surface. *Low strength when wet* usually refers to silty soils that are easily deformed and subject to failure when saturated. *Low strength when dry* usually refers to loose, sandy soils that have low bearing strength when dry.

Slippery when wet is a limitation if the soils have more than 2 inches (5 centimeters) of silt, silt loam, or very fine sandy loam at the surface. Slippage of tires and tracks can be a significant problem when the soil is wet following snowmelt in spring and during rainy periods.

Dusty when dry is a limitation if the soils have a silt, silt loam, or very fine sandy loam surface that produces dust under traffic during dry periods.

Permafrost is a limitation if the soils have permafrost within the soil profile. Disturbing the plant cover and the ground surface commonly results in thawing of the permafrost and, in areas of ice-rich permafrost, excessive wetness and subsidence of the surface.

Recreation

The soils of the survey area are rated in table 9 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, the ability of the soil to support vegetation, access to water, potential water impoundment sites, and access to public sewer lines or the capacity of the soil to absorb septic tank effluent. Soils subject to flooding are limited to varying degrees for recreational uses by the duration of flooding and the season when flooding occurs. Onsite assessment of the height, duration, intensity, and frequency of flooding is essential in planning recreational facilities.

In the table, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in the table can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 11 and interpretations for dwellings without basements and for local roads and streets in table 10.

Camp areas are tracts of land used intensively as sites for tents, trailers, and campers and for related outdoor activities. These areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The ratings are based on the soil properties that affect the ease of developing camp areas and performance of the areas after development. Also considered are the soil properties that influence trafficability and the growth of vegetation after heavy use.

Picnic areas are natural or landscaped tracts of land that are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The ratings are based on the soil properties that affect the cost of shaping the site, trafficability, and the growth of vegetation after development. The surface of picnic areas should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry.

Playgrounds are areas used intensively for baseball, football, and similar activities. A nearly level soil that is free of stones and can withstand heavy foot traffic and maintain adequate plant cover is needed. The ratings are based on the soil properties that affect the cost of shaping the site, trafficability, and the growth of vegetation. Slope and stoniness are the main concerns affecting the development of playgrounds. The surface of playgrounds should

readily absorb rainfall, remain firm under heavy foot traffic, and not be dusty when dry.

Paths and trails are areas used for hiking and horseback riding. The areas should require little or no cutting and filling during site preparation. The ratings are based on the soil properties that influence trafficability and erodibility. Paths and trails should remain firm under foot traffic and not be dusty when dry.

Engineering

This section provides information for planning land uses related to urban development and water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data was collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Table 10 shows the degree and kind of soil limitations that affect shallow excavations, dwellings without basements, small commercial buildings, and local roads and streets. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock or permafrost, stone content, soil texture, and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls

or banks to sloughing or caving is affected by soil texture and depth to the water table.

Dwellings and *small commercial buildings* are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, freezing and thawing, and organic layers can cause footings to move. A high water table, depth to bedrock or permafrost, large stones, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 or 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or stabilized soil material; and a flexible or rigid surface. Cuts and fills generally are limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or permafrost, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, potential for frost action, and depth to a high water table affect the traffic-supporting capacity.

Sanitary Facilities

Table 11 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 11 also shows the suitability of the soils for use as daily cover for landfill. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock or permafrost, and flooding affect absorption of the effluent. Large stones and bedrock or permafrost interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Aerobic lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Relatively impervious soil material for the lagoon floor and sides is needed to minimize seepage and contamination of local ground water.

Table 11 gives ratings for the natural soil that makes up the lagoon floor. The surface layer, and generally 1 or 2 feet of soil material below the surface layer, are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or permafrost, flooding, large stones, and content of organic matter.

Excessive seepage resulting from rapid permeability in the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and permafrost can cause construction problems, and

large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of groundwater pollution. Ease of excavation and revegetation should be considered.

The ratings in the table are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or permafrost, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, permafrost, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to wind erosion.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 12 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is excavated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help to determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, permafrost, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable unfrozen material, a low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have a moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, permafrost, slopes of more than 25 percent, or a water table at a depth of less than 1 foot. They may have more than one of these characteristics. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and *gravel* are natural aggregates suitable for commercial use with minimal processing. They are used in many kinds of construction. Specifications for each use vary widely. In the table, only the probability of finding material in suitable quantity in the soil or below is evaluated. The suitability of the material for

specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has an unfrozen layer of clean sand or gravel or a layer of sand or gravel that is as much as 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, permafrost, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable, loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, do not have permafrost, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils do not have permafrost and are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel or stones, have permafrost, have slopes of more than 15 percent, or have a seasonal high water table at or near the surface.

The surface layer of most soils generally is preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 13 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed excavated ponds. The limitations are considered *slight* if soil properties and site features generally are favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives the restrictive features that affect drainage, irrigation, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to gravel or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In the table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth

below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table and permeability of the aquifer. Depth to bedrock and the content of large stones affect the ease of excavation.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, permafrost, or other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and the potential for frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity in the root zone. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock or permafrost. The performance of a system is affected by the depth of the root zone, the amount of salts or sodium, and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to control erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or permafrost affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or permafrost affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties is collected during the course of the soil survey. The data and the estimates of soil and water features listed in tables are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classification, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 14 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each taxonomic unit under the heading "Taxonomic Units and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 1982) and the Unified soil classification system (ASTM, 1988).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, SP-SM.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit,

and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

Table 15 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each taxonomic unit under the heading "Taxonomic Units and Their Morphology."

Clay as a soil separate, or component, consists of mineral soil particles that are less than 0.002 millimeters in diameter. The estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earth-moving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3-bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for some soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The classes are *low,* a change of less than 3 percent; *moderate,* 3 to 6 percent; and *high,* more than 6 percent. *Very high,* more than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are

based primarily on percentage of silt, very fine sand, sand, and organic matter (as much as 4 percent) and on soil structure and permeability. The estimates are modified by the presence of rock fragments. Values of K range from 0.02 to 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their resistance to wind erosion in cultivated areas. The groups indicate the susceptibility of soil to wind erosion. The groups are as follows:

1. The soils are 1 to 9 percent dry aggregates. These soils are very highly erodible. Crops can be grown if intensive measures to control wind erosion are used.
2. The soils are 10 to 24 percent dry aggregates. These soils are highly erodible. Crops can be grown if intensive measures to control wind erosion are used.
3. The soils are 25 to 39 percent dry aggregates. These soils are erodible. Crops can be grown if intensive measures to control wind erosion are used.
4. The soils are 25 to 39 percent dry aggregates and are more than 35 percent clay or more than 15 percent calcium carbonate. These soils are moderately erodible. Crops can be grown if measures to control wind erosion are used.
5. The soils are 40 to 44 percent dry aggregates. These soils are slightly erodible. Crops can be grown if measures to control wind erosion are used.
6. The soils are 45 to 49 percent dry aggregates. These soils are very slightly erodible. Crops can easily be grown.
7. The soils are 50 percent dry aggregates or more. These soils are very slightly erodible. Crops can easily be grown.
8. Stony, gravelly, or wet soils and other soils that are not subject to wind erosion.

Water Features

Table 16 gives estimates of various water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups consist of soils that, when saturated, have the same runoff potential under similar storm and ground cover conditions. The soil properties that affect the runoff potential are those that influence the minimum rate of infiltration in a bare, unfrozen soil after prolonged wetting. These properties include the depth to a seasonal high water table, the intake rate, permeability, and the depth to a layer that has very slow permeability. The affect of ground cover and slope are not considered in assigning hydrologic soil groups.

The infiltration rate is the rate at which water enters the soil at the surface. It is controlled by surface conditions. The transmission rate is the rate at which water moves through the soil. It is controlled by the soil properties.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of very deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist mainly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist mainly of soils having a layer that impedes the downward movement of water or soils that have moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist mainly of soils that have a permanent high water table and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding, the temporary covering of the soil surface by flowing water, is caused by overflow from streams or by runoff from adjacent slopes. Shallow water standing or flowing for short periods after rainfall or snowmelt is not considered flooding. Water standing in marshes and swamps or in closed depressions is considered to be ponding rather than flooding.

Table 16 gives the frequency and duration of flooding and the time of year when flooding is most likely to occur.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, occasional, or frequent. *None* means that flooding is not probable; *rare* that it is unlikely but is possible under unusual weather conditions (the chance of flooding is nearly 0 percent to 5 percent in any year); *occasional* that it occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year); and *frequent* that it

occurs often under normal weather conditions (the chance of flooding is more than 50 percent in any year).

Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. The time of year that flooding is most likely to occur is expressed in months. About two-thirds to three-fourths of all flooding occurs during the stated period.

The information on flooding is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered are local information about the extent and level of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone during the wettest season. It is at least 6 inches thick, persists in the soil for more than a few weeks, and is within 6 feet of the surface. Indicated in the table are the depth to the seasonal high water table; the kind of water table—that is, perched or apparent; and the months of the year when the water table commonly is highest.

An *apparent* water table is indicated by the level at which water stands in a freshly dug, unlined borehole after adequate time is allowed for adjustment in the surrounding soil. A *perched* water table is water standing above an unsaturated zone. The basis for determining that a water table is perched may be general knowledge of the area. The water table is considered perched if the water level in a borehole lowers when the borehole is extended.

Two numbers in the column showing depth to the water table indicate the normal range in depth to a saturated zone. Depth is given to the nearest half foot. The first numeral in the range indicates the highest water level. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. “More than 6.0” indicates that the water table is below a depth of 6 feet or that it is within a depth of 6 feet for less than a month.

Soil Features

Table 17 gives estimates of various soil features. The estimates are used in land use planning that involves engineering considerations.

Depth to bedrock is given if bedrock is within a depth of 60 inches. The depth is based on many soil borings and on observations during soil mapping. The rock is either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Subsidence is the settlement of organic soils or of saturated mineral soils of very low density. Subsidence generally results from either desiccation and shrinkage or oxidation of organic material, or both, following drainage. Subsidence takes place gradually, usually over a period of several years. Table 17 shows the expected initial subsidence, which usually is a result of drainage, and total subsidence, which results from a combination of factors.

Potential frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave), and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage mainly to pavements and other rigid structures.

A *low* potential for frost action indicates that the soil is rarely susceptible to the formation of ice lenses; *moderate* that the soil is susceptible to the formation of ice lenses, resulting in frost heave and the subsequent loss of soil strength; and *high* that the soil is highly susceptible to the formation of ice lenses, resulting in frost heave and the subsequent loss of soil strength.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil.

Special site examination and design may be needed if the combination of factors results in a

severe hazard of corrosion. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion—expressed as *low, moderate,* or *high*—is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low, moderate,* or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Physical and Chemical Analysis of Selected Soils

The results of physical analysis of several typical pedons in the survey area are given in table 18, and the results of chemical analysis are given in table 19. The data are for soils sampled at carefully selected sites. The pedons are typical of the taxonomic units and are described in the section "Taxonomic Units and Their Morphology." Soil samples were analyzed by the National Soil Survey Laboratory in Lincoln, Nebraska.

Most determinations, except those for grain-size analysis and bulk density, were made on soil material smaller than 2 millimeters in diameter. Measurements reported as percent or quantity of unit weight were calculated on an ovendry basis. The methods used in obtaining the data are indicated in the list that follows. The codes in parentheses refer to published methods (USDA, 1996).

Coarse materials—(2-75 mm fraction) weight estimates of the percentages of all material less than 75 mm (3B1).
Sand—(0.05-2.0 mm fraction) weight percentages of material less than 2 mm (3A1).
Silt—(0.002-0.05 mm fraction) pipette extraction, weight percentages of all material less than 2 mm (3A1).
Clay—(fraction less than 0.002 mm) pipette extraction, weight percentages of material less than 2 mm (3A1).
Water retained—pressure extraction, percentage of ovendry weight of less than 2 mm material; $^1/_3$ or $^1/_{10}$ bar (4B1), 15 bars (4B2).
Bulk density—of less than 2 mm material, saran-coated clods $^1/_3$ bar (4A1d), ovendry (4A1h).
Linear extensibility—change in clod dimension based on whole soil (4D).
Organic carbon—wet combustion. Walkley-Black modified acid-dichromate, ferric sulfate titration (6A1c).
Total nitrogen—Kjeldahl (6B3).
Cation-exchange capacity—ammonium acetate, pH 7.0, steam distillation (5A8b).
Cation-exchange capacity—sum of cations (5A3a).
Base saturation—ammonium acetate, pH 7.0 (5C1).
Base saturation—sum of cations, TEA, pH 8.2 (5C3).
Reaction (pH)—1:1 water dilution (8C1f).

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (Soil Survey Staff, 1998; USDA, 1975). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 20 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Twelve soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol.* An example is Inceptisol.

SUBORDER. Each order is divided into suborders, primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Aquept (*Aqu,* meaning water, plus *ept,* from Inceptisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Cryaquepts (*Cry,* meaning cold, plus *aquept,* the suborder of the Inceptisols that has an aquic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic subgroup is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Histic* identifies the subgroup that has a thick, saturated organic surface. An example is Histic Cryaquepts.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, thickness of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is coarse-loamy, mixed, superactive, nonacid Histic Cryaquepts.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or the substratum can differ within a series.

Taxonomic Units and Their Morphology

In this section, each taxonomic unit recognized in the survey area is described. Characteristics of the soil and the material in which it formed are identified. A typical or sample pedon for each taxonomic unit is described. A pedon is a small, three-dimensional area of soil observed by excavating a hole down into the soil material. The detailed description of each soil horizon follows standards in the "Soil Survey Manual" (USDA, 1993). Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" (USDA, 1975) and in "Keys to Soil Taxonomy" (USDA, 1998). Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils.

Taxonomic units are the components of soil map units. The map units of each taxonomic unit are described in the section "Detailed Soil Map Units."

Aquic Cryofluvents

Taxonomic class: Aquic Cryofluvents

Depth class: Deep (more than 40 inches, or 102 centimeters) over sand and gravel
Drainage class: Somewhat poorly drained
Permeability: Rapid in the organic mat; moderate in the sand and silt
Position on landscape: Flood plains
Parent material: Alluvium
Slope range: 0 to 2 percent
Elevation: 1,000 to 1,100 feet (305 to 335 meters)

Sample Pedon

This pedon is on a 0-percent slope under open white spruce forest at an elevation of 1,025 feet (312 meters).

Oi—7 inches (18 centimeters) to 0; dark brown (7.5YR 3/2) slightly decomposed organic matter; many very fine to coarse roots; strongly acid (pH 5.4); clear wavy boundary.
Bw—0 to 30 inches (76 centimeters); dark grayish brown (2.5Y 4/2) and olive brown (2.5Y 4/4) silt loam stratified with fine sand; few fine prominent strong brown (7.5YR 4/6) mottles; single grain; nonsticky and nonplastic; neutral (pH 6.8); gradual smooth boundary.
C1—30 to 40 inches (76 to 102 centimeters); dark grayish brown (2.5Y 4/2) stratified sand and fine sand; single grain; loose, nonsticky and nonplastic; neutral (pH 7.2); clear wavy boundary.
Oib—40 to 46 inches (102 to 117 centimeters); dark brown (7.5YR 3/4) slightly decomposed organic matter; neutral (pH 6.6); clear smooth boundary.
C2—46 to 50 inches (117 to 127 centimeters); dark gray (N 4/0) silty clay loam; massive; sticky and plastic; neutral (pH 6.6).

Sample Pedon Location

Map unit in which located: 203—Aquic Cryofluvents-Typic Cryaquents complex
Location in survey area: In the SE$^1/_4$SW$^1/_4$ of sec. 26, T. 9 S., R. 11 E.; transect 91DS522, hole 8

Range in Characteristics

Profile:
Thickness of organic mat—4 to 10 inches (10 to 25 centimeters)
Depth to sand and gravel—more than 40 inches (102 centimeters) from the mineral soil surface
Depth to seasonal high water table—2 to 4 feet (0.6 to 1.2 meters)

O horizon:
Color—hue of 10YR or 7.5YR; value of 2 or 3 moist; chroma of 1 or 2 moist
Reaction—pH 4.8 to 6.6

Bw horizon:
Color—hue of 7.5YR, 10YR, 2.5Y, 5Y, 5GY, or neutral; value of 4 moist; chroma of 0 to 6 moist
Texture—stratified silt loam, loamy fine sand, and fine sand
Reaction—pH 6.6 to 7.0

C horizon:
Color—hue of 10YR or 2.5Y; value of 3 or 4 moist; chroma of 1 to 6 moist
Texture—stratified sand, fine sand, loamy very fine sand, silt loam, and silty clay loam
Reaction—pH 6.6 to 7.6

Aquic Eutrocryepts

Taxonomic class: Aquic Eutrocryepts

Depth class: Shallow to very deep (10 to 60 inches, or 25 to 152 centimeters, or more) over sand and gravel
Drainage class: Somewhat poorly drained
Permeability: Rapid in the organic mat; moderate in the loamy material; rapid in the sand and gravel
Position on landscape: Flood plains
Parent material: Alluvium
Slope range: 0 to 3 percent
Elevation: 1,100 to 1,500 feet (335 to 457 meters)

Sample Pedon

This pedon is on a 0-percent slope under open black spruce forest at an elevation of 1,300 feet (396 meters).

Oi—7 inches (18 centimeters) to 0; dark brown (7.5YR 3/2) slightly decomposed organic matter; many very fine to medium roots; extremely acid (pH 4.2); clear smooth boundary.
AO—0 to 2 inches (5 centimeters); very dark gray (7.5YR 3/1) mucky silt loam; weak coarse subangular blocky structure; very friable, slightly sticky and slightly plastic; common very fine and fine roots; moderately acid (pH 5.6); clear wavy boundary.
Bw—2 to 18 inches (5 to 46 centimeters); brown (10YR 4/3) and grayish brown (2.5Y 5/2) stratified silt loam to fine sand; common coarse prominent strong brown (7.5YR 4/6) mottles; weak thick platy structure; friable, nonsticky and slightly plastic; few fine roots; slightly acid (pH 6.4); abrupt smooth boundary.

2C1—18 to 28 inches (46 to 71 centimeters); olive brown (2.5Y 4/4) coarse sand; single grain; loose, nonsticky and nonplastic; neutral (pH 6.6); clear smooth boundary.
2C2—28 to 60 inches (71 to 152 centimeters); variegated extremely gravelly sand; single grain; loose, nonsticky and nonplastic; 60 percent gravel.

Sample Pedon Location

Map unit in which located: 201—Aquic Eutrocryepts-Tanacross complex
Location in survey area: In the NE¼SW¼ of sec. 14, T. 13 S., R. 15 E.; transect 90DS513, hole 3

Range in Characteristics

Profile:
Thickness of organic mat—2 to 10 inches (5 to 25 centimeters)
Depth to sand and gravel—10 to 60 inches (25 to 152 centimeters) or more from the mineral soil surface
Depth to seasonal high water table—usually more than 6 feet (1.8 meters), but perched nearer the surface in spring

O horizon:
Color—hue of 5YR, 7.5YR, or 10YR; value of 2 or 3 moist; chroma of 2 or 3 moist
Reaction—pH 3.8 to 5.2

Bw horizon:
Color—hue of 2.5Y, 5Y, 5GY, neutral, or 10YR; value of 3 to 5 moist; chroma of 0 to 6 moist
Texture—silt loam, stratified silt loam, very fine sand, fine sand, loamy fine sand, or sand
Rock fragment content—0 to 10 percent
Reaction—pH 5.6 to 7.0

2C horizon:
Color—variegated
Texture—extremely gravelly coarse sand, extremely gravelly sand, very gravelly coarse sand, very gravelly sand, sand, or fine sand
Rock fragment content—40 to 70 percent
Reaction—pH 6.4 to 7.0

Beales Series

Taxonomic class: Sandy, mixed Typic Dystrocryepts

Depth class: Very deep (more than 60 inches, or 152 centimeters)
Drainage class: Somewhat excessively drained
Permeability: Rapid in the organic mat; moderate in the silt loam; rapid in the sand
Position on landscape: Crests and side slopes of sand dunes
Parent material: Loess over eolian sand
Slope range: 0 to 35 percent
Elevation: 1,150 to 1,250 feet (351 to 381 meters)

Typical Pedon

This pedon is on a 14-percent slope under white spruce, aspen, and black spruce forest at an elevation of 1,200 feet (366 meters).

Oi—3 inches (8 centimeters) to 0; brown (7.5YR 4/2) slightly decomposed organic matter; many very fine to medium roots; very strongly acid (pH 4.6); abrupt smooth boundary.
E—0 to 2 inches (5 centimeters); light brownish gray (10YR 6/2) silt loam; weak coarse granular structure; very friable, nonsticky and slightly plastic; common fine to coarse roots; very strongly acid (pH 4.8); abrupt smooth boundary.
2Bw—2 to 12 inches (5 to 27 centimeters); dark yellowish brown (10YR 4/4) and brown (7.5YR 4/4) stratified very fine sandy loam and loamy fine sand; massive; friable, nonsticky and nonplastic; few very fine and fine roots; moderately acid (pH 5.6); gradual smooth boundary.
2BC—12 to 29 inches (27 to 104 centimeters); dark yellowish brown (10YR 4/4) fine sand; massive; friable, nonsticky and nonplastic; moderately acid (pH 6.0); gradual smooth boundary.
2C—29 to 60 inches (104 to 152 centimeters); dark grayish brown (2.5Y 4/2) sand; massive; loose, nonsticky and nonplastic; slightly acid (pH 6.4).

Typical Pedon Location

Map unit in which located: 204—Beales-Lupine complex, steep
Location in survey area: In the SW¼SW¼ of sec. 15, T. 12 S., R. 15 E.; transect 90DS502, hole 1

Range in Characteristics

Profile:
Thickness of organic mat—2 to 5 inches (5 to 13 centimeters)
Depth to fine sand—2 to 16 inches (5 to 41 centimeters) from the mineral soil surface
Depth to seasonal high water table—more than 6 feet (1.8 meters)

B horizon:
Color—chroma of 3 to 5 moist
Texture—silt loam, fine sandy loam, or loamy fine sand
Reaction—pH 5.6 to 6.4

2C horizon:
Color—chroma of 4 or 5 moist
Texture—fine sand or sand, commonly with strata of silt loam
Reaction—pH 6.1 to 6.5

Chena Series

Taxonomic class: Sandy-skeletal, mixed Typic Cryorthents

Depth class: Very shallow (1 to 10 inches, or 3 to 25 centimeters) over sand and gravel
Drainage class: Excessively drained
Permeability: Moderate in the loam surface material; rapid in the sand and gravel
Position on landscape: Flood plains
Parent material: Alluvium
Slope range: 0 to 3 percent
Elevation: 1,050 to 1,300 feet (320 to 396 meters)

Typical Pedon

This pedon is on a 0-percent slope under open white spruce forest with lichen understory at an elevation of 1,100 feet (335 meters).

Oi—1 inch (3 centimeters) to 0; very dark brown (10YR 2/2) slightly decomposed organic matter; many very fine to coarse roots; very strongly acid (pH 4.8); abrupt smooth boundary.
AC—0 to 2 inches (5 centimeters); brown (10YR 4/3) loam; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; many very fine to coarse roots; moderately acid (pH 5.6); clear smooth boundary.
2C—2 to 60 inches (5 to 152 centimeters); variegated extremely gravelly sand; single grain; loose, nonsticky and nonplastic; 50 percent gravel and 10 percent cobbles; slightly acid (pH 6.4).

Typical Pedon Location

Map unit in which located: 214—Jarvis-Chena complex
Location in survey area: In the SE¼SE¼ of sec. 30, T. 10 S., R. 14 E.; transect 90DS514, hole 2

Range in Characteristics

Profile:
Thickness of organic mat—0 to 5 inches (13 centimeters)
Depth to sand and gravel—4 to 10 inches (10 to 25 centimeters) from the mineral soil surface
Depth to seasonal high water table—more than 6 feet (1.8 meters)

O horizon:
Color— value of 2 or 3 moist
Reaction—pH 5.0 to 6.0

AC or C horizon:
Color—hue of 2.5Y or 10YR; value of 3 to 5 moist; chroma of 2 or 3 moist
Texture—silt loam or fine sandy loam
Rock fragment content—0 to 20 percent
Reaction—pH 5.6 to 6.5

2C horizon:
Color—variegated
Texture—extremely gravelly sand, extremely gravelly coarse sand, or very gravelly sand
Rock fragment content—40 to 80 percent

Cryofluvents

Taxonomic class: Cryofluvents

Depth class: Shallow to very deep (10 to 60 inches, or 25 to 152 centimeters, or more) over gravel
Drainage class: Poorly drained to well drained
Permeability: Rapid in the organic mat; moderate in the sand and silt; rapid in the sand and gravel
Position on landscape: Flood plains
Parent material: Alluvium
Slope range: 0 to 3 percent
Elevation: 1,000 to 1,400 feet (305 to 427 meters)

Sample Pedon

This pedon is on a 0-percent slope under white spruce forest at an elevation of 1,100 feet (335 meters).

Oi—5 inches (13 centimeters) to 0; dark brown, slightly decomposed organic matter; many very fine to coarse roots; abrupt wavy boundary.
Bw/A—0 to 2 inches (5 centimeters); strong brown (7.5YR 4/6) and dark brown (10YR 3/3) silt loam; weak medium granular structure; very friable, nonsticky and nonplastic; many very fine to coarse roots; slightly acid (pH 6.2); abrupt wavy boundary.
Oab—2 to 3 inches (5 to 8 centimeters); very dark brown muck; moderate medium granular structure; very friable, nonsticky and nonplastic; many very fine to coarse roots; neutral (pH 6.6); abrupt wavy boundary.
C1—3 to 14 inches (8 to 36 centimeters); dark yellowish brown (10YR 4/4) stratified fine sand and silt; common medium distinct strong brown (7.5YR 4/6) and gray (5Y 5/1) mottles; moderate coarse subangular blocky structure; very friable, nonsticky and nonplastic; few very

fine and fine roots; neutral (pH 7.2); gradual wavy boundary.
C2—14 to 25 inches (36 to 64 centimeters); dark yellowish brown (10YR 4/4) stratified fine sand and silt; few small distinct gray (5Y 5/1) mottles; massive; very friable, nonsticky and nonplastic; neutral (pH 7.2); abrupt wavy boundary.
2C—25 to 60 inches (64 to 152 centimeters); variegated extremely gravelly sand; single grain; loose, nonsticky and nonplastic; 65 percent gravel; neutral (pH 7.2).

Sample Pedon Location

Map unit in which located: 206—Cryofluvents, rarely flooded
Location in survey area: In the SW¼SE¼ of sec. 8, T. 10 S., R. 14 E.; transect 91MC057, hole 7

Range in Characteristics

Profile:
Thickness of organic mat—0 to 8 inches (20 centimeters)
Depth to sand and gravel—10 to 60 inches (25 to 152 centimeters) or more from the mineral soil surface
Depth to seasonal high water table—1 to 6 feet (0.3 to 1.8 meters) or more

O horizon:
Color—hue of 10YR or 7.5YR; value of 2 or 3 moist; chroma of 2 to 6 moist
Reaction—pH 4.6 to 6.0

C horizon:
Color—hue of 2.5Y or 10YR; value of 2 to 6 moist; chroma of 2 to 4 moist
Texture—stratified silty clay loam, silt loam, fine sand, and sand
Rock fragment content—0 to 10 percent
Reaction—pH 6.0 to 7.4

2C horizon:
Color—variegated
Texture—extremely gravelly sand, very gravelly sand, or very gravelly coarse sand
Rock fragment content—40 to 70 percent

Donnelly Series

Taxonomic class: Sandy-skeletal, mixed Typic Eutrocryepts

Depth class: Very shallow (0 to 10 inches, or 0 to 25 centimeters) over sand, gravel, and cobbles
Drainage class: Somewhat excessively drained
Permeability: Rapid in the organic mat; moderate in the loamy surface material; rapid in the sand, gravel, and cobbles
Position on landscape: Stream terraces
Parent material: Loess over alluvium
Slope range: 0 to 3 percent
Elevation: 1,300 to 1,500 feet (396 to 457 meters)

Typical Pedon

This pedon is on a 0-percent slope under open black spruce forest at an elevation of 1,400 feet (427 meters).

Oi—2 inches (5 centimeters) to 0; dark brown (7.5YR 3/2) slightly decomposed organic matter; common very fine to coarse roots; extremely acid (pH 4.2); abrupt smooth boundary.
A—0 to 1 inch (3 centimeters); very dark brown (10YR 2/2) silt loam; weak medium subangular blocky structure; friable, nonsticky and nonplastic; very strongly acid (pH 4.8); common very fine and fine roots; abrupt wavy boundary.
Bw—1 inch to 6 inches (3 to 15 centimeters); dark yellowish brown (10YR 4/4) silt loam; massive; friable, slightly sticky and slightly plastic; few very fine roots; 10 percent stones; moderately acid (pH 6.0); gradual smooth boundary.
2BC—6 to 12 inches (15 to 30 centimeters); dark yellowish brown (10YR 4/4) very gravelly sandy loam; massive; friable, nonsticky and nonplastic; 30 percent gravel, 20 percent cobbles, and 10 percent stones; moderately acid (pH 6.0); gradual smooth boundary.
2C—12 to 60 inches (30 to 152 centimeters); variegated extremely gravelly sand; single grain; loose, nonsticky and nonplastic; 40 percent gravel, 20 percent cobbles, and 10 percent stones; moderately acid (pH 6.0).

Typical Pedon Location

Map unit in which located: 207—Donnelly silt loam
Location in survey area: In the NW¼SE¼ of sec. 22, T. 14 S., R. 16 E.; transect 93DS506, hole 6

Range in Characteristics

Profile:
Thickness of organic mat—2 to 7 inches (5 to 18 centimeters)
Depth to sand and gravel—1 to 10 inches (3 to 25 centimeters) from the mineral soil surface
Depth to seasonal high water table—more than 6 feet (1.8 meters)

O horizon:
Color—hue of 7.5YR or 10YR; chroma of 2 or 3 moist
Reaction—pH 4.2 to 4.8

Bw horizon:
Color—chroma of 3 to 5 moist
Texture—silt loam or gravelly silt loam
Rock fragment content—0 to 35 percent
Reaction—pH 5.6 to 6.0

2C horizon:
Color—variegated
Texture—extremely gravelly coarse sand or sand
Rock fragment content—60 to 90 percent
Reaction—pH 6.1 to 7.3

Gerstle Series

Taxonomic class: Coarse-loamy, mixed, superactive Aquic Eutrocryepts

Depth class: Deep and very deep (more than 40 inches, or 102 centimeters) over sand and gravel
Drainage class: Well drained
Permeability: Rapid in the organic mat; moderate in the loamy material; rapid in the sand and gravel
Position on landscape: Flood plains
Parent material: Alluvium
Slope range: 0 to 3 percent
Elevation: 1,050 to 1,500 feet (320 to 457 meters)

Typical Pedon

This pedon is on a 0-percent slope under black spruce forest at an elevation of 1,150 feet (351 meters).

Oi—8 inches (20 centimeters) to 0; dark brown (7.5YR 3/2) slightly decomposed organic matter; many very fine to coarse roots; extremely acid (pH 4.2); clear smooth boundary.
AE—0 to 2 inches (5 centimeters); black (10YR 2/1) and brown (10YR 5/3) silt loam; weak medium subangular blocky structure; friable, nonsticky and slightly plastic; few very fine and fine roots; strongly acid (pH 5.2); abrupt wavy boundary.
Bw—2 to 35 inches (5 to 89 centimeters); brown (10YR 4/3) and dark brown (7.5YR 4/4) stratified silt loam to loamy fine sand; common coarse prominent grayish brown (2.5Y 5/2) mottles; weak medium subangular blocky structure; very friable, nonsticky and nonplastic; few very fine and fine roots; moderately acid (pH 5.6); gradual smooth boundary.
BC—35 to 60 inches (89 to 152 centimeters); dark grayish brown (2.5Y 4/2) and dark yellowish brown (10YR 4/4) silt loam; massive; very friable, nonsticky and nonplastic; moderately acid (pH 6.0).

Typical Pedon Location

Map unit in which located: 208—Gerstle silt loam
Location in survey area: In the $SW^1/_4SW^1/_4$ of sec. 6, T. 11 S., R. 14 E.; transect 90DS509, hole 10

Range in Characteristics

Profile:
Thickness of organic mat—2 to 8 inches (5 to 20 centimeters)
Depth to sand and gravel—more than 40 inches (102 centimeters) from the mineral soil surface
Depth to seasonal high water table—usually more than 6 feet (1.8 meters), but perched near the surface in spring

O horizon:
Reaction—pH 4.0 to 4.6

Bw horizon:
Color—chroma of 2 to 4 moist
Texture—stratified silt loam, loamy fine sand, and fine sand
Reaction—pH 5.1 to 6.0

2C horizon (where present):
Color—variegated
Texture—extremely gravelly sand or very gravelly sand
Rock fragment content—60 to 90 percent

Histosols

Taxonomic class: Histosols

Depth class: Shallow and moderately deep (10 to 30 inches or 25 to 76 centimeters) over permafrost and very deep (no permafrost)
Drainage class: Very poorly drained
Permeability: Rapid in the slightly decomposed surface peat; moderate or low in the moderately decomposed to highly decomposed subsurface peat and mineral layers; impermeable in the frozen layer (where present)
Position on landscape: Flood plains and glacial moraines
Parent material: Organic material over alluvium
Slope range: 0 to 2 percent
Elevation: 1,000 to 1,600 feet (305 to 488 meters)

Sample Pedon

This pedon is on a 0-percent slope under bog birch shrub at an elevation of 1,050 feet (320 meters).

Oi—0 to 7 inches (18 centimeters); very dark brown (10YR 2/2) peat; many very fine to coarse roots; slightly acid (pH 6.4); abrupt smooth boundary.
Bg—7 to 8 inches (18 to 20 centimeters); gray (5Y 5/1) silt loam; massive; slightly sticky and slightly plastic; neutral (pH 6.6); abrupt smooth boundary.

Oe—8 to 20 inches (20 to 51 centimeters); very dark brown (10YR 2/2) peat; many very fine and fine roots; neutral (pH 6.6); clear smooth boundary.
Bg1—20 to 30 inches (51 to 76 centimeters); gray (5Y 5/1) and very dark brown (10YR 2/2) silt loam; massive; slightly sticky and slightly plastic; neutral (pH 6.8); diffuse wavy boundary.
Bg2—30 to 60 inches (76 to 152 centimeters); olive brown (2.5Y 4/4) and gray (5Y 5/1) very fine sandy loam; massive; nonsticky and nonplastic; neutral (pH 7.2).

Sample Pedon Location

Map unit in which located: 210—Histosols-Liscum complex
Location in survey area: In the NW¼NW¼ of sec. 11, T. 10 S., R. 12 E.; transect 91DS505, hole 1

Range in Characteristics

Profile:
Thickness of organic mat—more than 16 inches (40 centimeters)
Depth to permafrost (where present)—10 to 30 inches (25 to 76 centimeters) below the surface
Depth to seasonal high water table—ponded to a depth of 1 foot (0.3 meter) below the surface

O horizon:
Color—hue of 10YR or 7.5YR; value of 2 or 3 moist; chroma of 1 to 4 moist
Reaction—pH 4.4 to 6.6

Bg horizon (where present):
Color—hue of 2.5Y, 5Y, or 5GY; value of 4 or 5 moist; chroma of 1 or 2 moist
Texture—silt loam, gravelly silt loam, or very gravelly sandy loam or stratified fine sand, silt, and muck
Rock fragment content—0 to 50 percent
Reaction—pH 6.6 to 7.2

Iksgiza Series

Taxonomic class: Coarse-loamy over sandy or sandy-skeletal, mixed, superactive, subgelic Typic Histoturbels

Depth class: Very shallow to moderately deep (3 to 26 inches or 8 to 66 centimeters) over permafrost
Drainage class: Poorly drained
Permeability: Rapid in the organic mat; moderate in the silt loam; impermeable in the frozen silt loam
Position on landscape: Low sand dunes
Parent material: Loess over eolian sand
Slope range: 0 to 8 percent
Elevation: 1,200 to 1,350 feet (366 to 411 meters)

Typical Pedon

This pedon is on a 3-percent slope under black spruce forest at an elevation of 1,300 feet (396 meters).

Oi—10 to 4 inches (25 to 10 centimeters); dark brown (7.5YR 3/2) slightly decomposed peat; many very fine to coarse roots; strongly acid (pH 5.2); clear smooth boundary.
Oa—4 inches (10 centimeters) to 0; black (10YR 2/1) muck; many very fine to coarse roots; strongly acid (pH 5.2); gradual smooth boundary.
A—0 to 2 inches (5 centimeters); black (10YR 2/1) mucky silt loam; massive; friable, slightly sticky and slightly plastic; many very fine and fine roots; slightly acid (pH 6.2); clear smooth boundary.
Bg/A—2 to 10 inches (5 to 25 centimeters); dark grayish brown (10YR 4/2) and black (10YR 2/1) silt loam; common medium dark brown (7.5YR 3/4) mottles; massive; friable, slightly sticky and slightly plastic; slightly acid (pH 6.2); abrupt smooth boundary.
Bg/Af—10 to 20 inches (25 to 51 centimeters); dark grayish brown (10YR 4/2) and black (10YR 2/1) frozen silt loam; massive; very hard, slightly sticky and slightly plastic; slightly acid (pH 6.2).

Typical Pedon Location

Map unit in which located: 211—Iksgiza peat, undulating
Location in survey area: In the NW¼SW¼ of sec. 10, T. 13 S., R. 15 E.; transect 91DS524, hole 2

Range in Characteristics

Profile:
Thickness of organic mat—8 to 11 inches (20 to 28 centimeters)
Depth to sand—18 to 40 inches (46 to 102 centimeters) from the mineral soil surface
Depth to permafrost—3 to 26 inches (8 to 66 centimeters) from the mineral soil surface
Depth to seasonal high water table—at the surface to a depth of 1.5 feet (0.5 meter)

O horizon:
Color—hue of 10YR or 7.5YR; value of 2 or 3 moist; chroma of 1 or 2 moist
Reaction—pH 4.5 to 5.5

Bg horizon:
Color—hue of 10YR, 2.5Y, or 5Y; value of 3 to 5 moist; chroma of 2 or 3 moist
Reaction—pH 5.8 to 6.6

2C horizon (where present):
Color—hue of 10YR or 2.5Y; value of 4 moist; chroma of 2 or 3 moist
Texture—fine sand or loamy fine sand
Reaction—pH 6.0 to 7.0

Jarvis Series

Taxonomic class: Coarse-loamy over sandy or sandy skeletal, mixed, superactive, nonacid Typic Cryofluvents

Depth class: Shallow and moderately deep over sand and gravel (10 to 40 inches, or 25 to 102 centimeters)
Drainage class: Well drained
Permeability: Moderate in the loamy surface material; rapid in the sand and gravel
Position on landscape: Flood plains
Parent material: Alluvium
Slope range: 0 to 3 percent
Elevation: 1,050 to 1,300 feet (320 to 396 meters)

Typical Pedon

This pedon is on a 0-percent slope under white spruce forest at an elevation of 1,100 feet (335 meters).

Oi—4 inches (10 centimeters) to 0; dark brown (7.5YR 3/2) slightly decomposed organic matter; many very fine to coarse roots; moderately acid (pH 5.8); clear smooth boundary.
C1—0 to 9 inches (23 centimeters); light brownish gray (2.5Y 6/2) silt loam; common fine prominent dark yellowish brown (10YR 4/4) mottles; weak thick platy structure; friable, slightly sticky and slightly plastic; few very fine to coarse roots; neutral (pH 6.6); abrupt smooth boundary.
C2—9 to 36 inches (23 to 91 centimeters); grayish brown (2.5Y 5/2) stratified very fine sand to silt loam; massive; loose, nonsticky and nonplastic; few fine roots; neutral (pH 7.2); clear smooth boundary.
2C—36 to 60 inches (91 to 152 centimeters); variegated extremely gravelly coarse sand; single grain; loose, nonsticky and nonplastic; 60 percent gravel and 5 percent cobbles; neutral (pH 7.2).

Typical Pedon Location

Map unit in which located: 213—Jarvis silt loam, moderately deep
Location in survey area: In the NW¼NE¼ of sec. 5, T. 11 S., R. 14 E.; transect 91DS534, hole 7

Range in Characteristics

Profile:
Thickness of organic mat—0 to 7 inches (18 centimeters)
Depth to sand and gravel—10 to 40 inches (25 to 102 centimeters) from the mineral soil surface
Depth to seasonal high water table—more than 6 feet (1.8 meters)

O horizon:
Color—hue of 7.5YR or 10YR; chroma of 2 to 4 moist
Reaction—pH 4.4 to 6.0

C horizon:
Color—hue of 10YR or 2.5Y; value of 4 or 5 moist; chroma of 2 to 4 moist
Texture—silt loam, fine sandy loam, or very fine sand that commonly is stratified
Rock fragment content—0 to 10 percent
Reaction—pH 6.4 to 7.4

2C horizon:
Color—variegated
Texture—very gravelly sand or extremely gravelly sand
Rock fragment content—50 to 80 percent

Koyukuk Series

Taxonomic class: Coarse-silty, mixed, superactive Typic Dystrocryepts

Depth class: Deep and very deep (more than 40 inches, or 102 centimeters) over sand
Drainage class: Well drained
Permeability: Rapid in the organic mat; moderate in the loamy surface material; moderately rapid in the sand
Position on landscape: Sand dunes
Parent material: Loess over eolian sand
Slope range: 0 to 35 percent
Elevation: 1,200 to 1,300 feet (366 to 396 meters)

Typical Pedon

This pedon is on a 2-percent slope under white spruce forest at an elevation of 1,230 feet (375 meters).

Oi—3 inches (8 centimeters) to 0; dark brown (7.5YR 3/2) slightly decomposed organic matter; many very fine to coarse roots; moderately acid (pH 5.8); clear wavy boundary.
AB—0 to 10 inches (25 centimeters); brown (10YR 4/3) silt loam; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; few fine roots; slightly acid (pH 6.4); gradual smooth boundary.

Bw—10 to 28 inches (25 to 71 centimeters); dark brown (10YR 3/3) silt loam; common fine prominent brown (7.5YR 4/4) mottles; weak medium platy structure; friable, slightly sticky and slightly plastic; few fine roots; slightly acid (pH 6.4); diffuse smooth boundary.
C—28 to 60 inches (71 to 152 centimeters); grayish brown (10YR 5/2) very fine sandy loam; common fine prominent brown (7.5YR 4/4) mottles; massive; friable, slightly sticky and slightly plastic; few fine roots; neutral (pH 6.6).

Typical Pedon Location

Map unit in which located: 215—Koyukuk silt loam, rolling
Location in survey area: In the NW¼SE¼ of sec. 19, T. 12 S., R. 15 E.; transect 91DS 502, hole 2

Range in Characteristics

Profile:
Thickness of organic mat—2 to 8 inches (5 to 20 centimeters)
Depth to fine sand—more than 40 inches (102 centimeters) from the mineral soil surface
Depth to seasonal high water table—more than 6 feet (1.8 meters)

O horizon:
Color—hue of 10YR or 7.5YR; value of 2 or 3 moist; chroma of 1 to 3 moist
Reaction—pH 5.6 to 6.6

AB horizon:
Color—hue of 10YR or 7.5YR; value of 3 to 5 moist; chroma of 2 to 6 moist
Texture—silt loam or very fine sandy loam
Reaction—pH 6.0 to 6.6

2C horizon (where present):
Color—hue of 2.5Y or 10YR; value of 4 to 6 moist; chroma of 2 or 3 moist
Texture—fine sand or very fine sand
Reaction—pH 6.4 to 7.2

Liscum Series

Taxonomic class: Coarse-loamy, mixed, superactive, nonacid Histic Cryaquepts

Depth class: Very deep (more than 60 inches, or 152 centimeters)
Drainage class: Very poorly drained
Permeability: Rapid in the slightly decomposed surface peat; moderate or low in the subsurface peat and mineral soil
Position on landscape: Flood plains
Parent material: Organic material over alluvium
Slope range: 0 to 2 percent
Elevation: 1,000 to 1,150 feet (305 to 357 meters)

Typical Pedon

This pedon is on a 0-percent slope under open black spruce-tamarack forest at an elevation of 1,050 feet (320 meters).

Oi—12 to 6 inches (30 to 15 centimeters); dark brown (7.5YR 3/2) slightly decomposed organic matter; many very fine to coarse roots; strongly acid (pH 5.4); clear smooth boundary.
Oe—6 inches (15 centimeters) to 0; black (N 2/0) moderately decomposed organic matter; many very fine to medium roots; neutral (pH 7.0); abrupt wavy boundary.
Bg1—0 to 19 inches (0 to 48 centimeters); olive brown (2.5Y 4/4) and gray (5Y 5/1) stratified silt loam and loamy fine sand; massive; slightly sticky and slightly plastic; few very fine to coarse roots; neutral (pH 7.0); clear wavy boundary.
Oab—19 to 26 inches (48 to 66 centimeters); very dark grayish brown (10YR 3/2) muck; slightly acid (pH 6.4); clear wavy boundary.
Ab—26 to 34 inches (66 to 86 centimeters); black (5Y 2.5/1) and dark gray (5Y 4/1) silt loam; massive; slightly sticky and slightly plastic; neutral (pH 6.6); clear smooth boundary.
Bg2—34 to 50 inches (86 to 127 centimeters); greenish gray (5GY 5/1) and dark gray (5Y 4/1) silt loam; massive; slightly sticky and slightly plastic; neutral (pH 6.8).

Typical Pedon Location

Map unit in which located: 216—Liscum and Mosquito peats
Location in survey area: In the SE¼NW¼ of sec. 6, T. 10 S., R. 12 E.; transect 91DS510, hole 3

Range in Characteristics

Profile:
Thickness of organic mat—8 to 16 inches (20 to 40 centimeters)
Depth to sand and gravel—more than 40 inches (102 centimeters) from the mineral soil surface
Depth to seasonal high water table—at the surface to a depth of 1 foot (0.3 meter)

O horizon:
Color—hue of 7.5YR or 10YR; value of 2 to 4 moist; chroma of 1 or 2 moist
Reaction—pH 5.6 to 6.5

Bg horizon:
Color—matrix hue of 2.5Y, 5Y, 5GY, or neutral; value of 4 or 5 moist; chroma of 0 to 2 moist

Texture—stratified silt loam, fine sand, and very fine sand
Reaction—pH 6.1 to 7.3

2C horizon (where present):
Color—variegated
Texture—very gravelly or extremely gravelly sand or coarse sand
Rock fragment content—50 to 70 percent

Lupine Series

Taxonomic class: Coarse-loamy over sandy or sandy-skeletal, mixed, superactive Typic Eutrocryepts (fig. 5)

Depth class: Shallow (10 to 20 inches, or 25 to 51 centimeters) over sand and gravel
Drainage class: Well drained
Permeability: Rapid in the organic mat; moderate in the loamy material; rapid in the sand and gravel
Position on landscape: Flood plains
Parent material: Alluvium
Slope range: 0 to 3 percent
Elevation: 1,050 to 1,300 feet (320 to 396 meters)

Typical Pedon

This pedon is on a 0-percent slope under black spruce-quaking aspen forest at an elevation of 1,100 feet (335 meters).

Oi—4 inches (10 centimeters) to 0; dark brown (7.5YR 3/2) slightly decomposed organic matter; very strongly acid (pH 4.8); clear smooth boundary.
A—0 to 3 inches (8 centimeters); dark brown (10YR 3/3) silt loam; weak medium subangular blocky structure and weak fine granular; friable, slightly sticky and slightly plastic; common very fine to coarse roots; moderately acid (pH 5.6); clear wavy boundary.
Bw—3 to 11 inches (8 to 28 centimeters); brown (10YR 4/3) silt loam; moderate thin platy structure; friable, slightly sticky and slightly plastic; few very fine roots; moderately acid (pH 5.8); abrupt smooth boundary.
2C1—11 to 15 inches (28 to 38 centimeters); olive brown (2.5Y 4/3) fine sand; single grain; loose, nonsticky and nonplastic; moderately acid (pH 6.0); clear smooth boundary.
2C2—15 to 60 inches (38 to 102 centimeters); variegated extremely gravelly sand; single grain; loose, nonsticky and nonplastic; 55 percent gravel and 5 percent cobbles.

Typical Pedon Location

Map unit in which located: 217—Lupine silt loam
Location in survey area: In the SW¼SE¼ of sec. 35, T. 10 S., R. 13 E.; transect 90DS503, hole 7

Range in Characteristics

Profile:
Thickness of organic mat—1 to 9 inches (3 to 23 centimeters)
Depth to sand and gravel—10 to 30 inches (20 to 76 centimeters) from the mineral soil surface
Depth to seasonal high water table—more than 6 feet (1.8 meters)

O horizon:
Color—hue of 7.5YR or 10YR; value of 2 or 3 moist; chroma of 2 or 3 moist
Reaction—pH 4.5 to 5.2

Bw horizon:
Color—chroma of 3 or 4 moist
Texture—silt loam, fine sandy loam, or very fine sandy loam
Rock fragment content—0 to 5 percent
Reaction—pH 5.8 to 6.4

2C horizon:
Color—variegated
Texture—extremely gravelly sand, very gravelly sand, extremely gravelly coarse sand, or sand
Rock fragment content—50 to 80 percent

Moosehead Series

Taxonomic class: Coarse-loamy over sandy or sandy-skeletal, mixed, superactive Aquic Eutrocryepts

Depth class: Moderately deep (20 to 40 inches, or 51 to 102 centimeters) over sand and gravel
Drainage class: Well drained
Permeability: Rapid in the organic mat; moderate in the loamy material; rapid in the sand and gravel
Position on landscape: Flood plains
Parent material: Alluvium
Slope range: 0 to 3 percent
Elevation: 1,050 to 1,500 feet (320 to 457 meters)

Typical Pedon

This pedon is on a 0-percent slope under black spruce forest at an elevation of 1,100 feet (335 meters).

Oi—5 inches (13 centimeters) to 0; dark brown (7.5YR 3/2) slightly decomposed organic matter;

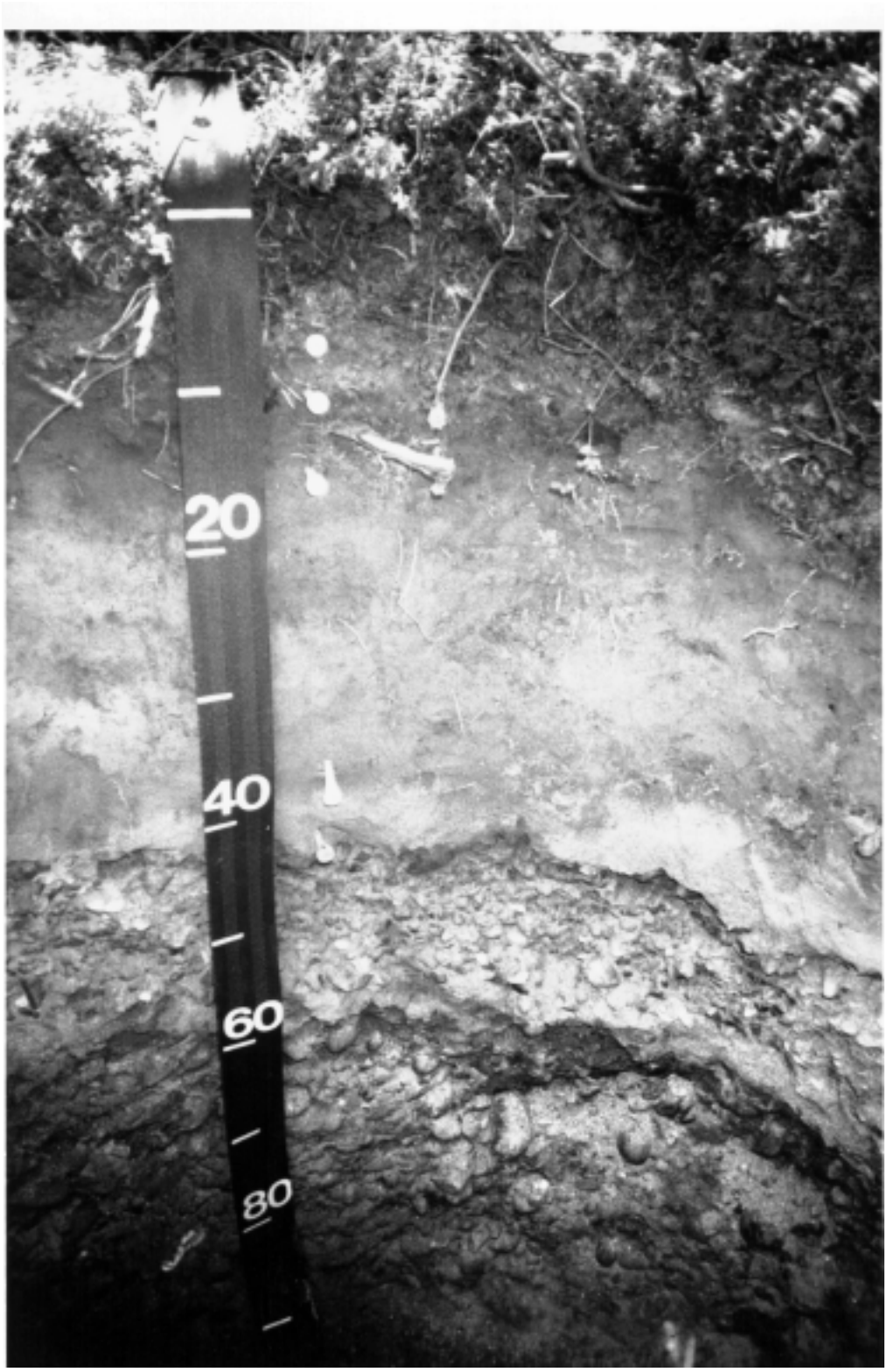


Figure 5.—Typical profile of a Lupine soil. This soil has an organic surface layer about 3 inches thick (7 centimeters) over brown silt loam and fine sandy loam. Sand and gravel are below a depth of about 18 inches (45 centimeters).

many very fine and common fine roots; extremely acid (pH 4.0); clear smooth boundary.
A—0 to 1 inch (3 centimeters); dark grayish brown (10YR 4/2) silt loam; few fine distinct dark yellowish brown (10YR 4/6) mottles; weak medium platy structure parting to thin platy; very friable, nonsticky and slightly plastic; common very fine and fine roots; strongly acid (pH 5.4); abrupt wavy boundary
Bw1—1 inch to 11 inches (3 to 28 centimeters); dark yellowish brown (10YR 4/6) stratified silt loam to loamy very fine sand; many coarse prominent grayish brown (2.5Y 5/2) mottles; massive parting to weak thin platy structure; very friable, nonsticky and nonplastic; few very fine to medium roots; moderately acid (pH 5.6); gradual smooth boundary.
Bw2—11 to 30 inches (28 to 76 centimeters); dark yellowish brown (10YR 4/4) stratified silt loam to loamy very fine sand; few fine prominent dark grayish brown (10YR 4/4) mottles; massive parting to weak thin platy structure; very friable, nonsticky and nonplastic; few fine and medium roots; moderately acid (pH 5.8); clear smooth boundary.
2C—30 to 60 inches (76 to 152 centimeters); variegated extremely gravelly sand; single grain; loose, nonsticky and nonplastic; 55 percent gravel and 5 percent cobbles.

Typical Pedon Location

Map unit in which located: 219—Moosehead silt loam
Location in survey area: In the NE¼NE¼ of sec. 1, T. 11 S., R. 13 E.; transect 90DS504, hole 5

Range in Characteristics

Profile:
Thickness of organic mat—2 to 8 inches (5 to 20 centimeters)
Depth to sand and gravel—18 to 40 inches (46 to 102 centimeters) from the mineral soil surface
Depth to seasonal high water table—usually more than 6 feet (1.8 meters), but perched near the surface in spring

O horizon:
Color—hue of 10YR or 7.5YR; value of 2 or 3 moist
Reaction—pH 4.6 to 5.6

B horizon:
Color—hue of 10YR or 2.5Y; value of 4 or 5 moist; chroma of 2 to 6 moist
Texture—stratified silt loam, loamy fine sand, and fine sand
Reaction—pH 6.0 to 6.8

2C horizon:
Color—variegated
Texture—very gravelly sand or extremely gravelly sand
Rock fragment content—40 to 80 percent

Mosquito Series

Taxonomic class: Coarse-loamy, mixed, superactive subgelic Ruptic Histoturbels

Depth class: Very shallow to moderately deep (0 to 30 inches, or 0 to 76 centimeters) over permafrost
Drainage class: Very poorly drained
Permeability: Moderate or rapid in the organic mat; moderate in the silt loam; impermeable in the frozen silt loam
Position on landscape: Flood plains
Parent material: Alluvium, and loess over alluvium
Slope range: 0 to 2 percent
Elevation: 1,000 to 1,400 feet (305 to 427 meters)

Typical Pedon

This pedon is on a 0-percent slope under open tamarack-black spruce forest at an elevation of 1,050 feet (320 meters).

Oi—10 to 8 inches (25 to 20 centimeters); dark brown (7.5YR 3/2) slightly decomposed peat; many very fine to coarse roots; strongly acid (pH 5.2); clear smooth boundary.
Oa—8 inches (20 centimeters) to 0; black (10YR 2/1) muck; few fine and medium roots; neutral (pH 6.6); abrupt broken boundary.
Bg—0 to 8 inches (20 centimeters); olive gray (5Y 4/2) and olive brown (2.5Y 4/4) silt loam; many coarse prominent strong brown (7.5YR 4/6) mottles; massive; slightly sticky and slightly plastic; neutral (pH 6.6); abrupt wavy boundary.
Bgf—8 to 20 inches (20 to 50 centimeters); dark yellowish brown (10YR 4/6) and dark grayish brown (2.5Y 4/2) frozen silt loam; massive; very hard, slightly sticky and slightly plastic (where thawed); neutral (pH 6.6).

Typical Pedon Location

Map unit in which located: 216—Liscum and Mosquito peats
Location in survey area: In the SW¼SW¼ of sec. 3, T. 9 S., R. 12 E.; transect 91DS508, hole 7

Range in Characteristics

Profile:
Thickness of organic mat—4 to 16 inches (10 to 40 centimeters)

Depth to permafrost—5 to 30 inches (12 to 76 centimeters) below the mineral soil surface
Depth to seasonal high water table—ponded to a depth of 1 foot (0.3 meter) below the surface

O horizon:
Color—hue of 10YR or 7.5YR; value of 2 or 3 moist; chroma of 1 or 2 moist
Reaction—pH 5.4 to 6.4

Bg horizon:
Color—hue of 2.5Y or 5Y; value of 3 to 5 moist; chroma of 1 to 6 moist
Texture—silt loam or fine sandy loam
Reaction—pH 5.8 to 6.6

Bgf horizon:
Color—hue of 10YR, 2.5Y, or 5Y; value of 3 to 6 moist; chroma of 1 to 6 moist
Texture—silt loam or fine sandy loam
Reaction—pH 6.4 to 7.0

Salchaket Series

Taxonomic class: Coarse-loamy, mixed, superactive, nonacid Typic Cryofluvents (fig. 6)

Depth class: Deep and very deep (40 to 60 inches, or 102 to 152 centimeters, or more) to sand and gravel
Drainage class: Well drained
Permeability: Moderate in the loamy material; rapid in the sand and gravel
Position on landscape: Flood plains
Parent material: Alluvium
Slope range: 0 to 3 percent
Elevation: 1,000 to 1,400 feet (305 to 427 meters)

Typical Pedon

This pedon is on a 0-percent slope under closed white spruce forest at an elevation of 1,250 feet (381 meters).

Oi—3 inches (8 centimeters) to 0; black (10YR 2/1) slightly decomposed organic matter; many very fine to coarse roots; slightly acid (pH 6.2); abrupt smooth boundary.
C—0 to 2 inches (5 centimeters); dark yellowish brown (10YR 4/4) silt loam; weak thin platy structure; friable, nonsticky and slightly plastic; common very fine to medium roots; neutral (pH 6.6); abrupt smooth boundary.
Ab—2 to 3 inches (5 to 8 centimeters); very dark brown (10YR 2/2) silt loam; weak fine granular structure; very friable, nonsticky and slightly plastic; many very fine to coarse roots; moderately acid (pH 5.8); abrupt smooth boundary.
Bg—3 to 7 inches (8 to 18 centimeters); brown (10YR 5/3) and light olive gray (5Y 6/2) very fine sandy loam; many medium prominent yellowish brown (10YR 5/6) mottles; weak thin platy structure; friable, nonsticky and slightly plastic; few fine and medium roots; neutral (pH 6.6); clear wavy boundary.
C1—7 to 50 inches (18 to 127 centimeters); light olive brown (2.5Y 5/4) stratified silt loam to loamy very fine sand; weak thin platy structure; friable, nonsticky and slightly plastic; few fine and medium roots; neutral (pH 7.2); clear wavy boundary.
C2—50 to 60 inches (127 to 152 centimeters); light olive brown (2.5Y 5/4) silt loam; massive; friable, nonsticky and slightly plastic; neutral (pH 7.2).

Typical Pedon Location

Map unit in which located: 222—Salchaket silt loam
Location in survey area: In the NW¼NW¼ of sec. 30, T. 12 S., R. 15 E.; transect 90DS515, hole 1

Range in Characteristics

Profile:
Thickness of organic mat—1 to 6 inches (3 to 15 centimeters)
Depth to sand and gravel—more than 40 inches (102 centimeters) from the mineral soil surface
Depth to seasonal high water table—more than 6 feet (1.8 meters)

O horizon:
Color—hue of 10YR, 7.5YR, or 5YR; value of 2 or 3 moist; chroma of 2 to 6 moist
Reaction—pH 4.8 to 6.4

C horizon:
Color—hue of 2.5Y or 10YR; value of 4 or 5 moist; chroma of 2 to 4 moist
Texture—stratified silt loam, loamy fine sand, very fine sand, and sand
Reaction—pH 6.2 to 7.2

2C horizon (where present):
Color—variegated
Texture—very gravelly sand or extremely gravelly sand
Rock fragment content—40 to 80 percent

Tanacross Series

Taxonomic class: Coarse-loamy, mixed, superactive, subgelic Typic Histoturbels

Depth class: Very shallow and shallow (5 to 20 inches,

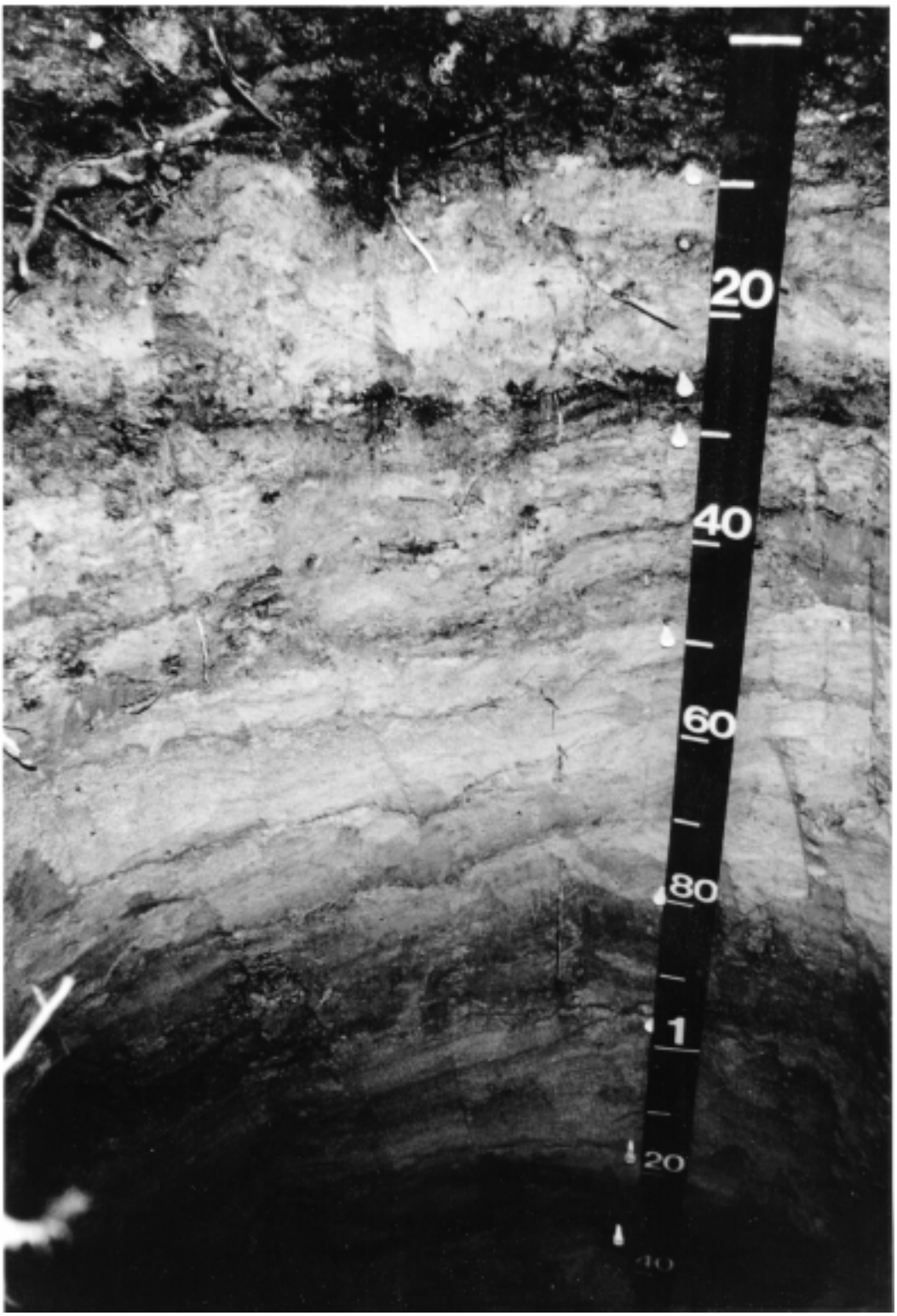


Figure 6.— Area of a Salchaket soil. This soil has about 4 inches (10 centimeters) of organic matter over silt loam and fine sand. The dark bands are layers of buried organic matter that were on the soil surface. The numerals on the tape indicate centimeters (20 centimeters equals approximately 8 inches).

or 12 to 50 centimeters) over permafrost
Drainage class: Poorly drained
Permeability: Rapid in the organic mat; moderate in the loamy material; impermeable in the frozen loamy material
Position on landscape: Flood plains
Parent material: Organic material over alluvium or loess
Slope range: 0 to 5 percent
Elevation: 1,100 to 1,500 feet (335 to 457 meters)

Typical Pedon

This pedon is on a 0-percent slope under open black spruce forest at an elevation of 1,300 feet (396 meters).

Oi—9 inches (23 centimeters) to 0; strong brown (7.5YR 5/6) slightly decomposed organic matter; extremely acid (pH 4.0); clear wavy boundary.
A—0 to 6 inches (15 centimeters); very dark gray (10YR 3/1) silt loam; weak thick platy structure; firm, nonsticky and slightly plastic; common very fine and fine roots; moderately acid (pH 5.6); clear wavy boundary.
Bg—6 to 11 inches (15 to 28 centimeters); very dark grayish brown (10YR 3/2 and 2.5Y 3/2) silt loam; common medium prominent strong brown (7.5YR 5/6) mottles; massive; firm, nonsticky and slightly plastic; moderately acid (pH 5.8); abrupt wavy boundary.
Bgf—11 to 20 inches (28 to 51 centimeters); very dark grayish brown (2.5Y 3/2) frozen silt loam; many coarse prominent yellowish brown (10YR 5/8) mottles; massive; extremely hard, nonsticky and slightly plastic (where thawed); moderately acid (pH 6.0).

Typical Pedon Location

Map unit in which located: 223—Tanacross peat
Location in survey area: In the SE¼NE¼ of sec. 15, T. 13 S., R. 15 E.; transect 90DDS501, hole 1

Range in Characteristics

Profile:
Thickness of organic mat—8 to 16 inches (20 to 40 centimeters)
Depth to sand and gravel—more than 35 inches (89 centimeters) below the mineral soil surface
Depth to permafrost—5 to 20 inches (12 to 50 centimeters) below the mineral soil surface
Depth to seasonal high water table—at the surface to a depth of 1 foot (0.3 meter)

O horizon:
Color—hue of 10YR, 7.5YR, or 5YR; value of 2 to 5 moist; chroma of 1 to 6 moist
Reaction—pH 4.0 to 5.6

Bg horizon:
Color—hue of 2.5Y, 5Y, or 7.5YR; value of 4 or 5 moist; chroma of 2 to 6 moist
Texture—silt loam or stratified silt loam, fine sandy loam, and loamy fine sand
Reaction—pH 5.4 to 6.6

2C horizon (where present):
Color—variegated
Texture—very gravelly or extremely gravelly sand or corase sand
Rock fragment content—30 to 80 percent

Tetlin Series

Taxonomic class: Coarse-loamy, mixed, superactive, subgelic Typic Aquiturbels

Depth class: Shallow and moderately deep (10 to 35 inches, or 25 to 89 centimeters) over permafrost
Drainage class: Poorly drained
Permeability: Rapid in the organic mat; moderate in the silt loam; impermeable in the frozen silt loam
Position on landscape: Side slopes of bedrock hills
Parent material: Loess
Slope range: 3 to 50 percent
Elevation: 1,250 to 2,000 feet (381 to 610 meters)

Typical Pedon

This pedon is on a 30-percent slope under white spruce forest at an elevation of 1,500 feet (457 meters).

Oi—7 inches to 1 inch (18 to 3 centimeters); dark brown (7.5YR 3/2) slightly decomposed organic matter; extremely acid (pH 4.4); clear wavy boundary.
OE—1 inch (3 centimeters) to 0; light brownish gray (10YR 6/2) peaty silt loam; single grain; loose, nonsticky and nonplastic; many very fine to coarse roots; extremely acid (pH 4.2); clear wavy boundary.
Bw—0 to 16 inches (41 centimeters); dark brown (10YR 3/3) silt loam; weak coarse subangular blocky structure; friable, nonsticky and slightly plastic; few very fine and fine roots; moderately acid (pH 5.8); abrupt smooth boundary.
Bgf—16 to 60 inches (41 to 152 centimeters); olive brown (2.5Y 4/4) silt loam; common coarse distinct dark grayish brown (2.5Y 4/2) mottles; massive parting to weak medium platy structure; very hard, nonsticky and slightly plastic; slightly acid (pH 6.4).

Typical Pedon Location

Map unit in which located: 226—Tetlin silt loam, 15 to 50 percent slopes
Location in survey area: In the SW¼SW¼ of sec. 36, T. 12 S., R. 15 E.; transect 90DS505, hole 2

Range in Characteristics

Profile:
Thickness of organic mat—4 to 8 inches (10 to 20 centimeters)
Depth to permafrost—5 to 40 inches (13 to 102 centimeters) below the mineral soil surface
Depth to seasonal high water table—at the surface to a depth of 3 feet (0.9 meter)

O horizon:
Color—value of 2 or 3 moist; chroma of 2 to 4 moist
Reaction—pH 4.2 to 6.2

Bw horizon:
Color—value of 2 to 4 moist; chroma of 3 or 4 moist
Reaction—pH 5.8 to 7.6

Bg horizon:
Color—hue of 10YR or 2.5Y; value of 3 or 4 moist; chroma of 2 to 4 moist
Reaction—pH 6.4 to 7.6

Typic Aquorthels

Taxonomic class: Typic Aquorthels

Depth class: Moderately deep to very deep (20 to 55 inches, or 51 to 140 centimeters) over permafrost
Drainage class: Poorly drained
Permeability: Rapid in the organic mat; moderate in the loamy material; impermeable in the frozen loamy material
Position on landscape: Glacial moraines
Parent material: Colluvium and loess
Slope range: 0 to 40 percent
Elevation: 1,300 to 1,800 feet (396 to 549 meters)

Sample Pedon

This pedon is on a 5-percent slope under white birch-white spruce forest at an elevation of 1,500 feet (457 meters).

Oi—3 inches (8 centimeters) to 0; dark brown (7.5YR 3/2) slightly decomposed organic matter; many very fine to coarse roots; moderately acid (pH 5.8); abrupt smooth boundary.
A—0 to 9 inches (0 to 23 centimeters); dark brown (7.5YR 3/2) silt loam; weak coarse granular structure; friable, nonsticky and slightly plastic; few very fine and fine roots; slightly acid (pH 6.2); gradual smooth boundary.
Bg—9 to 33 inches (23 to 83 centimeters); dark grayish brown (2.5Y 4/2) silt loam; many coarse prominent strong brown (7.5YR 4/6) mottles; weak coarse subangular blocky structure; friable, nonsticky and slightly plastic; 5 percent gravel; neutral (pH 6.8); abrupt smooth boundary.
Bgf—33 to 60 inches (83 to 152 centimeters); dark gray (5Y 4/1) frozen silt loam; common medium prominent strong brown (7.5YR 4/6) mottles; massive; extremely hard, nonsticky and slightly plastic (where thawed); 5 percent gravel; neutral (pH 7.0)

Sample Pedon Location

Map unit in which located: 231—Typic Eutrocryepts-Typic Aquorthels complex, steep
Location in survey area: In the SW¼SE¼ of sec. 32, T. 23 N., R. 16 E.; transect 90DS507, hole 7

Range in Characteristics

Profile:
Thickness of organic mat—2 to 6 inches (5 to 15 centimeters)
Depth to permafrost—24 to 55 inches (61 to 140 centimeters) below the mineral soil surface
Depth to seasonal high water table—at the surface to a depth of 3 feet (0.9 meter)

O horizon:
Color—value of 2 or 3 moist; chroma of 1 to 3 moist
Reaction—pH 5.0 to 5.8

A horizon:
Color—value of 2 or 3 moist; chroma of 1 to 3 moist
Texture—silt loam or mucky silt loam
Reaction—pH 5.4 to 6.2

Bg horizon:
Color—hue of 2.5Y or 10YR; value of 4 or 5 moist; chroma of 2 to 4 moist
Texture—silt loam or very fine sandy loam
Reaction—pH 6.0 to 7.0

Typic Cryaquents

Taxonomic class: Typic Cryaquents

Depth class: Very deep (more than 60 inches, or 152 centimeters)
Drainage class: Very poorly drained
Permeability: Rapid in the organic mat; moderate in the sand and silt
Position on landscape: Flood plains
Parent material: Alluvium

Slope range: 0 to 2 percent
Elevation: 1,000 to 1,100 feet (305 to 335 meters)

Sample Pedon

This pedon is on a 0-percent slope under sedge-grass wet meadow at an elevation of 1,025 feet (312 meters).

Oe—5 inches (13 centimeters) to 0; dark brown (7.5YR 3/2) moderately decomposed organic matter; common fine roots; slightly acid (pH 6.2); abrupt smooth boundary.
C1—0 to 1 inch (3 centimeters); gray (5Y 5/1) and dark yellowish brown (10YR 4/6) silty clay loam; massive; slightly sticky and slightly plastic; common very fine roots; slightly acid (pH 6.4); abrupt smooth boundary.
C2—1 inch to 7 inches (3 to 18 centimeters); gray (5Y 5/1) and dark yellowish brown (10YR 4/6) sand; single grain, nonsticky and nonplastic; few very fine and fine roots; slightly acid (pH 6.4); clear smooth boundary.
C3—7 to 25 inches (18 to 64 centimeters); dark gray (N 4/0) sand; single grain, nonsticky and nonplastic; neutral (pH 6.6); clear wavy boundary.
Oab—25 to 28 inches (64 to 71 centimeters); black (N 2/0) highly decomposed organic matter; neutral (pH 6.6); clear smooth boundary.
C4—28 to 60 inches (71 to 152 centimeters); dark gray (5Y 4/1) stratified silt loam to loamy fine sand; massive; slightly sticky and slightly plastic; neutral (pH 6.6); few fine roots.

Sample Pedon Location

Map unit in which located: 203—Aquic Cryofluvents-Typic Cryaquents complex
Location in survey area: In the NE¼NW¼ of sec. 35, T. 9 S., R. 11 E.; transect 91DS522, hole 4

Range in Characteristics

Profile:
Thickness of organic mat—2 to 6 inches (5 to 15 centimeters)
Depth to sand and gravel—more than 40 inches (102 centimeters) from the mineral soil surface
Depth to seasonal high water table—at the surface to a depth of 2 feet (0.6 meter)

O horizon:
Color—hue of 7.5YR or 10Y; value of 2 or 3 moist; chroma of 1 or 2 moist
Reaction—pH 5.0 to 6.2

C horizon:
Color—hue of 10YR, 2.5Y, 5Y, 5GY, or neutral; value of 4 or 5 moist; chroma of 0 to 6 moist
Texture—stratified sand, fine sand, loamy very fine sand, silt loam, and silty clay loam
Reaction—pH 6.4 to 7.4

2C horizon (where present):
Color—variegated
Texture—very gravelly sand, extremely gravelly sand, or sand

Typic Cryaquepts

Taxonomic class: Typic Cryaquepts

Depth class: Shallow to very deep (10 to 60 inches, or 25 to 152 centimeters, or more) over sand and gravel
Drainage class: Poorly drained
Permeability: Moderate in the loamy surface material; rapid in the sand and gravel
Position on landscape: Flood plains
Parent material: Alluvium
Slope range: 0 to 2 percent
Elevation: 1,000 to 1,150 feet (305 to 351 meters)

Sample Pedon

This pedon is on a 0-percent slope under bog birch shrub at an elevation of 1,070 feet (326 meters).

Oe—4 to 2 inches (10 to 5 centimeters); reddish gray (5YR 5/2) moderately decomposed organic matter; many very fine to medium roots; very strongly acid (pH 5.0); abrupt smooth boundary.
Oa—2 inches (5 centimeters) to 0; black (10YR 2/1) muck; many very fine to medium roots; strongly acid (pH 5.4); abrupt wavy boundary.
Bg1—0 to 5 inches (13 centimeters); bluish gray (5BG 4/1) silt loam; common medium prominent strong brown (7.5YR 5/6) mottles; weak thin platy structure; very friable, nonsticky and nonplastic; common very fine to medium roots; slightly acid (pH 6.5); abrupt irregular boundary.
Bw1—5 to 9 inches (13 to 23 centimeters); dark brown (7.5YR 4/4) silt loam; bluish gray (5BG 4/1) linings in root channels; many medium faint dark brown (10YR 4/3) mottles; weak thin platy structure; very friable, nonsticky and nonplastic; few very fine and fine roots; neutral (pH 7.1); gradual smooth boundary.
Bw2—9 to 35 inches (23 to 89 centimeters); dark brown (10YR 4/3) silt loam; olive gray (5Y 4/2) linings in root channels; many medium faint dark brown (7.5YR 4/4) mottles; weak thin platy structure; very friable, slightly sticky and nonplastic; few fine roots; mildly alkaline (pH 7.6); clear wavy boundary.

Bg2—35 to 55 inches (89 to 140 centimeters); olive gray (5Y 4/2) and dark brown (10YR 4/3) silt loam; many large faint dark brown (7.5YR 4/4) mottles; moderate medium platy structure; very friable, slightly sticky and nonplastic; mildly alkaline (pH 7.6); clear wavy boundary.
Bg3—55 to 61 inches (140 to 155 centimeters); dark gray (5Y 4/1) silt loam; common fine prominent brown (7.5YR 5/4) mottles; weak thin platy structure; very friable, slightly sticky and nonplastic; mildly alkaline (pH 7.6); abrupt smooth boundary.
2C—61 to 65 inches (155 to 165 centimeters); very dark grayish brown (10YR 3/2) very gravelly sand; many large prominent dark brown (7/5YR 4/4) mottles; single grain; loose, nonsticky and nonplastic; mildly alkaline (pH 7.5).

Sample Pedon Location

Map unit in which located: 202—Aquic Eutrocryepts-Typic Cryaquepts complex
Location in survey area: In the NE¼SE¼ of sec. 28, T. 10 S., R. 13 E.; lab sample S91AK-240-001

Range in Characteristics

Profile:
Thickness of organic mat—3 to 10 inches (8 to 25 centimeters)
Depth to sand and gravel—10 to 60 inches (25 to 152 centimeters) or more from the mineral soil surface
Depth to seasonal high water table—at the surface to a depth of 3 feet (0.9 meter)

O horizon:
Color—hue of 7.5YR or 10YR; value of 2 or 3 moist; chroma of 1 or 2 moist
Reaction—pH 5.0 to 6.2

Bg horizon:
Color—hue of 2.5Y, 5Y, neutral, or 10YR; value of 3 to 5 moist; chroma of 0 to 3 moist
Texture—silt loam, loamy very fine sand, loamy fine sand, fine sandy loam, or sand
Rock fragment content—0 to 20 percent
Reaction—pH 6.6 to 7.0

2C horizon:
Color—variegated
Texture—extremely gravelly sand or very gravelly sand
Rock fragment content—40 to 60 percent

Typic Eutrocryepts

Taxonomic class: Typic Eutrocryepts
Depth class: Shallow to deep (10 to 60 inches, or 30 to 152 centimeters) over sand and gravel or weathered bedrock
Drainage class: Well drained and somewhat excessively drained
Permeability: Rapid in the organic mat; moderate in the silt loam; moderately rapid or rapid in the substratum
Position on landscape: Side slopes, shoulders, and crests of glacial moraines and bedrock uplands
Parent material: Loess over eolian sand underlain by glacial till or weathered bedrock
Slope range: 0 to 60 percent
Elevation: 1,250 to 2,000 feet (381 to 610 meters)

Sample Pedon

This pedon is on a 0-percent slope under open white spruce-balsam poplar forest at an elevation of 1,500 feet (457 meters).

Oi—2 inches (5 centimeters) to 0; very dark grayish brown (10YR 3/2) slightly decomposed organic matter; many very fine to coarse roots; very strongly acid (pH 4.6); abrupt smooth boundary.
Bw—0 to 25 inches (0 to 64 centimeters); dark yellowish brown (10YR 4/4) and light olive brown (2.5Y 5/3) silt loam; weak thick platy structure; friable, nonsticky and slightly plastic; few very fine to coarse roots; slightly acid (pH 6.4); gradual smooth boundary.
C—25 to 38 inches (64 to 97 centimeters); light olive brown (2.5Y 5/3) and grayish brown (2.5Y 5/2) silt loam; massive; very friable, nonsticky and nonplastic; mildly alkaline (pH 7.4); clear wavy boundary.
2C—38 to 60 inches (97 to 152 centimeters); light olive brown (2.5Y 5/4) extremely cobbly sandy loam; massive; loose, slightly sticky and slightly plastic; 30 percent gravel and 40 percent cobbles; moderately alkaline (pH 8.0).

Sample Pedon Location

Map unit in which located: 230—Typic Eutrocryepts-Typic Histoturbels complex, steep
Location in survey area: In the SE¼NW¼ of sec. 9, T. 22 N., R. 16 E.; transect 90DS511, hole 7

Range in Characteristics

Profile:
Thickness of organic mat—0 to 7 inches (0 to 18 centimeters)
Depth to fine sand, sand and gravel, cobbles, or

weathered bedrock—10 to 60 inches (25 to 152 centimeters) from the mineral soil surface
Depth to seasonal high water table—more than 6 feet (1.8 meters)

O horizon:
Color—value of 2 or 3 moist; chroma of 1 to 3 moist
Reaction—pH 3.8 to 7.0

Bw horizon:
Color—hue of 10YR, 7.5YR, or 5YR; value of 3 to 5 moist; chroma of 3 to 6 moist
Texture—silt loam, very fine sandy loam, or fine sandy loam
Reaction—pH 6.0 to 7.6

2C horizon:
Color—hue of 2.5Y or 10YR; value of 3 to 5 moist; chroma of 2 to 4 moist
Texture—very cobbly sand, loamy sand, or sandy loam; gravelly or very gravelly sand, loamy sand, or sandy loam; fine sand; or extremely cobbly sandy loam
Rock fragment content—0 to 90 percent
Reaction—pH 6.4 to 8.0

Typic Histoturbels

Taxonomic class: Typic Histoturbels

Depth class: Very shallow to moderately deep (0 to 30 inches, or 0 to 76 centimeters) over permafrost
Drainage class: Poorly drained
Permeability: Rapid in the organic mat; moderate in the loamy surface material; impermeable in the frozen loamy underlying material
Position on landscape: Side slopes and depressions on glacial moraines
Parent material: Loess
Slope range: 0 to 20 percent
Elevation: 1,300 to 1,800 feet (396 to 549 meters)

Sample Pedon

This pedon is on a 4-percent slope under open black spruce forest at an elevation of 1,500 feet (457 meters).

Oi—12 to 6 inches (30 to 15 centimeters); dark brown (7.5YR 3/2) slightly decomposed organic matter; common very fine to coarse roots; extremely acid (pH 4.4); gradual smooth boundary.
OA—6 inches (15 centimeters) to 0; black (10YR 2/1) mucky silt loam; few very fine roots; strongly acid (pH 5.4); clear wavy boundary.
Bg/A—0 to 6 inches (0 to 15 centimeters); very dark grayish brown (2.5Y 3/2) and very dark brown (10YR 2/2) silt loam; massive; friable, slightly sticky and slightly plastic; moderately acid (pH 6.0); abrupt wavy boundary.
Bgf—6 to 10 inches (15 to 25 centimeters); dark grayish brown (2.5Y 4/2) and dark yellowish brown (10YR 4/6) frozen silt loam; massive; very hard, slightly sticky and slightly plastic (where thawed); moderately acid (pH 6.0).

Sample Pedon Location

Map unit in which located: 209—Typic Histoturbels-Histosols complex, gently sloping
Location in survey area: In the SE¼SE¼ of sec. 8, T. 14 S., R. 16 E.; transect 92DS511, hole 2

Range in Characteristics

Profile:
Thickness of organic mat—8 to 16 inches (20 to 41 centimeters)
Depth to permafrost—0 to 30 inches (76 centimeters) below the mineral soil surface
Depth to seasonal high water table—at the surface to a depth of 1 foot (0.3 meter)

O horizon:
Color—hue of 10YR, 7.5YR, or 5YR; value of 2 to 4 moist; chroma of 1 to 6 moist
Reaction—pH 4.4 to 5.4

Bg horizon:
Color—hue of 2.5Y, 5Y, or 10YR; value of 3 to 5 moist; chroma of 1 or 2 moist
Texture—silt loam or mucky silt loam
Reaction—pH 6.0 to 6.4

Bgf horizon:
Color—hue of 2.5Y, 5Y, or 10YR; value of 3 to 5 moist; chroma of 2 to 6 moist
Reaction—pH 6.0 to 6.6

Volkmar Series

Taxonomic class: Coarse-silty over sandy or sandy-skeletal, mixed, superactive Aquic Eutrocryepts

Depth class: Shallow and moderately deep (12 to 33 inches, or 30 to 84 centimeters) over sand, gravel, and cobbles
Drainage class: Moderately well drained
Permeability: Rapid in the organic mat; moderate in the silt loam; rapid in the sand, gravel, and cobbles
Position on landscape: Stream terraces
Parent material: Loess over alluvium

Slope range: 0 to 3 percent
Elevation: 1,250 to 1,500 feet (381 to 457 meters)

Typical Pedon

This pedon is on a 0-percent slope under black spruce forest at an elevation of 1,400 feet (427 meters).

Oi—7 inches to 1 inch (18 to 3 centimeters); dark brown (7.5YR 3/2) slightly decomposed organic matter; many very fine to coarse roots; very strongly acid (pH 4.8); clear smooth boundary.
OA—1 inch (3 centimeters) to 0; black (10YR 2/1) muck; few very fine and fine roots; strongly acid (pH 5.2); abrupt wavy boundary.
Bg—0 to 26 inches (0 to 66 centimeters); dark brown (10YR 3/3) and dark gray (10YR 4/1) silt loam; common coarse faint dark yellowish brown (10YR 4/4) mottles; weak thick platy structure; friable, slightly sticky and slightly plastic; few very fine roots; moderately acid (pH 5.6); gradual smooth boundary.
2C—26 to 60 inches (66 to 152 centimeters); variegated extremely gravelly sand; single grain; loose, nonsticky and nonplastic; moderately acid (pH 5.8).

Typical Pedon Location

Map unit in which located: 232—Volkmar silt loam

Location in survey area: In the SW$^1/_4$NE$^1/_4$ of sec. 23, T. 14 S., R. 16 E.; transect 91DS533, hole 6

Range in Characteristics

Thickness of organic mat—3 to 8 inches (8 to 20 centimeters)
Depth to sand, gravel, and cobbles: 15 to 33 inches (38 to 84 centimeters) from the mineral soil surface
Depth to seasonal high water table—usually more than 6 feet (1.8 meters), but perched near the surface in spring

O horizon:
Color—hue of 10YR or 7.5YR; value of 2 or 3 moist; chroma of 1 or 2 moist
Reaction—pH 4.2 to 5.4

Bg horizon:
Color—value of 4 or 5 moist; chroma of 2 to 4 moist
Texture—silt loam
Rock fragment content—0 to 10 percent
Reaction—pH 5.6 to 6.4

2C horizon:
Color—variegated
Texture—extremely gravelly coarse sand or sand
Rock fragment content—60 to 80 percent
Reaction—pH 5.8 to 6.6

Formation of the Soils

Soil is produced by soil-forming processes acting on material deposited by geologic forces. The characteristics of a soil are determined by the interaction of five major factors—(1) parent material; (2) climate; (3) living organisms; (4) topography; and (5) time (Jenny, 1941).

Parent Material

Many of the soils in the survey area formed in alluvium, or river deposits. These deposits consist of sand and gravel overlain by several inches to many feet of silt and fine sand. In areas where flooding is frequent or occasional, the soils exhibit stratification and have buried organic layers. These soils generally thaw early in summer, are well drained, and are classified at the subgroup level as Typic or Aquic Cryofluvents. In areas where flooding is rare and the loamy surface layer is less than 20 inches thick (50 centimeters), the soils are dry and the seasonal frost melts early in summer. These soils usually do not have mottles or buried organic layers, and they are classified at the subgroup level as Typic Eutrocryepts. In areas where the loamy mantle is thicker and flooding is rare, the soils are more moist and the seasonal frost persists until midsummer or they may have permafrost. These soils are classified at the subgroup level as Aquic Eutrocryepts or Typic Histoturbels.

Sand dunes are present on the flood plains. The soils on dunes formed in silty loess over fine sand. As with the rarely flooded alluvial soils, the soil features and classification depend mainly on the thickness of the loamy surface layer.

Soils in the southern part of the survey area formed in wind-deposited silt and sand over glacial till. The glacial till consists of cobbles, stones, and boulders mixed with sand and silt. As with the rarely flooded alluvial soils and the soils on sand dunes, the soil features and classification are affected by the thickness of the loamy surface layer. Soil climate, as influenced by aspect, also affects the characteristics of the soils. Soils that are classified at the subgroup level as Typic Histoturbels and formed in perennially frozen silt deposited by wind or by hillslope processes are in depressions on glacial moraines.

Soils on bedrock hills formed in wind-deposited silt and sand over weathered granitic rock. The microclimate, as influenced by aspect, is the most important factor in the soil morphology of these soils. Some of the soils in the poorly drained areas formed in partially decomposed plant parts that accumulated on the surface. Organic matter accumulated in these organic soils because the wetness caused the organic matter to decompose more slowly than it was produced by plants. Organic soils are in large areas between Clearwater Creek and the Tanana River, where ground water discharge keeps the soils constantly wet.

Loess continues to be deposited in the survey area. The deposition of loess raises the mineral content and reaction (pH) of the organic surface layers, allowing more nutrient-demanding vegetation to grow than would otherwise be possible.

Climate

The cold, rather dry climate of the survey area results in weak soil development and the formation of permafrost.

In addition to the effects of the regional climate, the soil climate is influenced by local site conditions. The soils on steep, south-facing slopes receive more solar radiation and thus are warmer than the soils on north-facing slopes or those in level areas. Seasonal frost in the soils on south-facing slopes melts early in summer. Because of the lack of a frost barrier and the rapid rate of runoff, the soils do not become wet enough to produce mottles. These soils are classified as Typic Eutrocryepts. In contrast, the soils on north-facing slopes are cold and usually have permafrost. They are classified as Typic Histoturbels or Typic Aquorthels.

The soil climate is also influenced by vegetation. The thick moss layer that is typical in areas of spruce forests insulates the soil in summer while still allowing considerable heat loss in winter. Thus, the soil commonly only thaws to a depth of less than 12

inches (30 centimeters) from the mineral soil surface in summer. In areas where the moss and organic mat is thin (less than 5 inches thick, or 13 centimeters) or is lacking, the soils commonly thaw to a depth of more than 5 feet (1.5 meters) in summer and most probably lack permafrost entirely.

For more information on the climate of the survey area, see the section “General Nature of the Survey Area.”

Living Organisms

Plants affect the soil by extracting water and nutrients from the soil through their roots, adding organic matter to the soil, and influencing the soil climate. Rapid cycling of nutrients through the soil tends to occur in areas that support stands of deciduous trees and shrubs, such as quaking aspen, bog birch, and highbush cranberry, because these plants annually grow nutrient-rich leaves that are added to the soil in fall. In contrast, nutrients are cycled slowly through soils that support dominantly evergreen vegetation, such as spruce, Labrador tea ledum, and mosses. In addition, the thick organic layer formed by mosses makes the soils cooler, which further inhibits decomposition of organic matter and the release of nutrients. Nutrients accumulate in the thick organic mat on the surface of the soils. The mat acts as a reservoir that stores nutrients in a form that is unavailable to plants. Hence, the forests on these soils tend to be less productive than those in areas where nutrients cycle rapidly and are more available to plants.

Fires are frequent in Interior Alaska in summer (Lutz, 1956). Fires can radically change the vegetation and thereby alter the soil properties affected by vegetation. By destroying most of the forest canopy and part of the organic mat, fire releases many stored nutrients and increases the soil temperature. Thus, permafrost is at a greater depth in the soils affected by fire or it is lacking completely. Fast-growing, nutrient-demanding plants, such as common fireweed, willows, and quaking aspen, tend to become established in recently burned areas. As time progresses after the fire, the organic mat builds up again, spruce and mosses become established, and the soil may have permafrost once again.

In very dry or wet areas, the fire-induced permafrost cycle does not exist. On steep, south-facing slopes and in areas that have a thin, loamy surface layer over a gravelly subsoil, the warm, dry conditions may prevent the establishment of a dense spruce forest with an understory of moss and may prevent the formation of permafrost. Conversely, in wet lowland areas, fires do not disturb the ecosystem enough to melt the permafrost and the spruce and moss plant community becomes re-established without an intervening period of deciduous vegetation.

Topography

Topography affects soil formation through its effect on soil climate, parent material, and drainage. In areas where slopes are long and steep, as on the bedrock uplands, aspect has a considerable effect on the soil climate and vegetation. Topography also affects the parent material in the bedrock uplands, dunes, and moraines. Erosion and the downslope movement of soil material result in a thicker layer of wind-deposited and slope-transported loamy material on lower lying slopes. Moisture collects in topographic depressions, which leads to saturated soils and encourages the formation of permafrost.

Time

A long period of time is required for soil horizons to form. In this survey area, geologic processes such as river erosion and channel migration, deposition of silt and sand during floods, erosion from hillslopes, and deposition of silt and sand by wind ensure the constant addition of new, unweathered material to the soils. Hence, the soils in the survey area are weakly developed. Most are classified as Entisols or Inceptisols, which include soils that are at the early stages of soil formation and are thus weakly developed.

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Glossary

ABC soil. A soil having an A, a B, and a C horizon.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Aspect. The direction in which a slope faces.

Association, soil. A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Backslope. The geomorphic component that forms the steepest inclined surface and principal element of many hillsides. Backslopes in profile are commonly steep, are linear, and descend to a footslope. Backslopes are erosional landforms produced mainly by mass wasting and running water.

Basal area. For trees, the area of a cross section of a single tree or all trees in a stand, generally referring to the section at breast height and measured outside the bark. It is a measure of stand density, commonly expressed in square feet per acre (square meter per hectare). For herbs and shrubs, the area or proportion of the ground surface covered by the stem or stems of plants at about ground level, commonly expressed in square feet per acre (square meter per hectare) or as a percentage.

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bog. A peat-forming ecosystem influenced solely by water that falls as rain or snow. Bog vegetation is dominantly herbs, shrubs, and stunted trees. *Sphagnum spp.* usually are dominant in the moss layer.

Boreal. Northern, or having to do with northern regions.

Canopy. The leafy crown of trees or shrubs.

Canopy cover. The proportion of the ground area that is covered by the vertical projection of the canopy, expressed as a percentage.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Coarse textured soil. Sand or loamy sand.

Cobble (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Cobbly soil material. Material that has 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material has 35 to 60 percent of these rock fragments, and extremely cobbly soil material has more than 60 percent.

Colluvium. Soil material or rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Conservation tillage. Any tillage and planting system that maintains a cover of crop residue on at least 30 percent of the soil surface after planting to reduce the hazard of water erosion. In areas where wind erosion is the primary concern, it is a system that maintains a cover of at least 1,000 pounds of flat small grain residue, or the equivalent, during the critical erosion period.

Consistence, soil. Refers to the "feel" of the soil and ease with which a lump can be crushed between the thumb and forefinger. Terms commonly used to describe consistence are as follows:
Loose.—Noncoherent when dry or moist; does not hold together in a mass.
Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.
Firm.—When moist, crushes under moderate pressure between thumb and forefinger but resistance is distinctly noticeable.
Plastic.—Readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.
Sticky.—Adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.
Hard.—When dry, moderately resistant to pressure and can be broken with difficulty between thumb and forefinger.
Soft.—When dry, breaks into powder or individual grains under very slight pressure.
Cemented.—Hard; little affected by moistening.

Corrosion. Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cover type. A unit of vegetation essentially similar in composition and development throughout. Synonyms: community type, vegetation type.

Cropping system. Growing crops according to a planned system of rotation and management practices.

Crop residue management. Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Dense layer (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Depth, soil. Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which commonly is the result of artificial drainage or irrigation but may also be the result of a sudden deepening of a channel or blockage of a drainage outlet. Seven classes of natural soil drainage are recognized. They are as follows:
Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.
Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.
Well drained.—Water is removed from the soil

readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, have a high water table, receive additional water from seepage, receive nearly continuous rainfall, or have a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. If rainfall is high and nearly continuous, however, the slope gradients can be moderate or high.

Drainage, surface. Runoff, or surface flow of water, from an area.

Ericaceous. Refers primarily to the heath family of plants, *Ericaceae*, for example, Labrador tea (*Ledum supp.*), but usually also includes the crowberry family of plants, *Empetraceae*.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.

Escarpment. A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. The term commonly is applied to cliffs resulting from differential erosion.

Excess fines (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grain is grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fast intake (in tables). The rapid movement of water into the soil.

Fen. A peat-forming ecosystem that has its source of water and minerals outside its limits. Fen vegetation is varied, but it generally has little, if any, *Sphagnum*.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to inundation under flood-stage conditions unless protected artificially. It is usually a constructional landform built of sediment deposited during overflow and lateral migration of the stream.

Footslope. The geomorphic component that forms the inner, gently inclined surface at the base of a hillslope. In profile, footslopes are commonly concave. In terms of gradational processes, a footslope is a transition zone between upslope sites of erosion (backslopes) and downslope sites of deposition (toeslopes).

Forest type. A unit of forest vegetation essentially similar in composition and development throughout.

Forest land. Refers to land on which the potential

natural plant community is dominantly forest that has more than 25 percent canopy cover.

Fragile (in tables). A soil that is easily damaged by use or disturbance.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Glacial outwash (geology). Gravel, sand, and silt, commonly stratified, deposited by glacial meltwater.

Glacial till (geology). Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that has 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Grazing land. Refers to land on which the potential natural plant community or other successional cover types are dominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing by domestic livestock. It includes rangeland and grazeable forestland.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water (geology). Water filling all the unblocked pores of the material below the water table.

Hard bedrock. Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the "Soil Survey Manual." The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Sedimentary beds of consolidated sandstone and semiconsolidated and consolidated shale. Generally, roots can penetrate this horizon only along fracture planes.

R layer.—Hard, consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The main consideration is the inherent capacity of soil free of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Irrigation. Application of water to soils to assist in production of crops.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low strength. The soil is not strong enough to support loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moraine. An accumulation of glacial drift in a topographic landform of its own, resulting mainly from the direct action of glacial ice. Some types of moraines are lateral, recessional, and terminal.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium,* from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse,* more than 15 millimeters (about 0.6 inch).

Muck. Dark, finely divided, well decomposed organic soil material.

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affects the specified use.

Permafrost. Layers of soil, or even bedrock, occurring in arctic or subarctic regions, in which a temperature below freezing has existed continuously for a long time.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability, measured in inches per hour, are as follows:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Pitting (in tables). Pits caused by melting of ice blocks within the soil. Pits form when the insulating plant cover is disturbed or removed.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Ponding. Standing water on soils in closed depressions. The water can be removed only by percolation or evapotranspiration.

Poor filter (in tables). Because of rapid permeability or the presence of an impermeable layer near the surface, the soil may not adequately filter effluent from a waste disposal system.

Poor outlets (in tables). Refers to areas where surface or subsurface drainage outlets are difficult or expensive to install.

Profile, soil. A vertical section of the soil extending

through all its horizons and into the parent material.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid	less than 3.5
Extremely acid	3.5 to 4.4
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rock outcrop. Exposures of bare bedrock other than lava flows and rock-lined pits.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Saturation. Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shrink-swell (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75.

Slippage (in tables). Soil mass susceptible to movement downslope when loaded, excavated, or wet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey, classes for slope are as follows:

Nearly level	0 to 3 percent
Gently sloping	1 to 5 percent
Undulating	0 to 8 percent
Rolling	0 to 15 percent
Steep	20 to 60 percent

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow intake (in tables). The slow movement of water into the soil.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soft bedrock. Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and

sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to wind erosion and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Surface soil. The A, E, AB, and EB horizons, considered collectively. It includes all subdivisions of these horizons.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old flood plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material that is too thin for the specified use.

Toeslope. The outermost inclined surface at the base of a hill. Toeslopes in profile are commonly gentle and linear.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Toxicity (in tables). Excessive amount of toxic substances, such as sodium or sulfur, that severely hinder establishment of vegetation or severely restrict plant growth.

Unstable fill (in tables). Risk of caving or sloughing on banks of fill material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Woodland. Refers to land on which the potential natural plant community is dominantly forest that has 10 to 25 percent canopy cover.

Tables

Table 1.--Temperature and Precipitation

(Recorded in the period 1965-93 at Clearwater, Alaska)

Month	Temperature						Precipitation			
	Average daily maximum	Average daily minimum	Average daily	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days*	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall**
	°F	°F	°F	°F	°F	Units	In	In	In		In
January----	-0.1	-19.0	-9.5	39	-65	0	0.93	0.37	1.39	2	7.6
February---	9.1	-14.0	-2.5	45	-58	0	0.68	0.26	1.03	2	6.1
March------	27.2	-2.6	12.3	50	-44	0	0.61	0.20	1.03	2	5.4
April------	43.3	16.3	29.8	64	-19	13	0.49	0.20	0.80	1	3.1
May--------	60.0	31.4	45.7	78	14	190	1.01	0.32	1.57	3	0.5
June-------	69.7	41.7	55.7	87	27	467	2.52	1.48	3.45	7	0.0
July-------	72.6	45.2	58.9	89	31	573	2.95	1.63	4.11	7	0.0
August-----	67.1	39.8	53.4	85	20	416	1.98	1.30	2.59	5	0.0
September--	54.1	29.2	41.6	72	8	121	1.42	0.53	2.17	4	1.8
October----	31.9	13.0	22.5	57	-27	10	1.41	0.88	2.00	4	11.5
November---	11.8	-6.7	2.5	42	-44	0	1.25	0.61	1.81	4	11.8
December---	3.9	-14.2	-5.1	40	-54	0	0.82	0.27	1.38	2	7.7
Yearly:											
Average---	37.5	13.3	25.4	---	---	---	---	---	---	---	---
Extreme---	93.0	-72.0	---	90	-64	---	---	---	---	---	---
Total-----	---	---	---	---	---	1,791	16.06	12.17	17.59	43	55.6

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40 degrees F; however, many plants have growth threshold temperatures not equal to 40 degrees). Only the growing degree days that occur within the growing season, which is defined by the occurrence of lethal low temperatues for a given crop (see table 2), should be considered available to that crop.

** The average number of days with at least 1 inch of snow on the ground is 182.

Table 2.--Freeze Dates in Spring and Fall

(Recorded in the period 1965-93 at Clearwater, Alaska)

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	May 27	June 28	July 26
2 years in 10 later than--	May 23	June 19	July 16
5 years in 10 later than--	May 14	June 3	June 26
First freezing Temperature in fall:			
1 year in 10 earlier than--	August 17	August 10	August 2
2 years in 10 earlier than--	August 21	August 14	August 6
5 years in 10 earlier than--	August 30	August 23	August 13

Table 3.--Growing Season
(Recorded in the period 1965-93 at Clearwater, Alaska)

Probability	Daily minimum temperature during growing season		
	Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	Days	Days	Days
9 years in 10	87	48	11
8 years in 10	94	59	23
5 years in 10	106	80	47
2 years in 10	119	101	70
1 year in 10	126	112	82

Table 4.--Acreage and Proportionate Extent of the Soils

Map symbol	Soil name	Acres	Percent
201	Aquic Eutrocryepts-Tanacross complex	2,731	3.3
202	Aquic Eutrocryepts-Typic Cryaquepts complex	6,360	7.7
203	Aquic Cryofluvents-Typic Cryaquents complex	981	1.2
204	Beales-Lupine complex, steep	270	0.3
205	Cryofluvents, occasionally flooded	3,629	4.4
206	Cryofluvents, rarely flooded	1,602	1.9
207	Donnelly silt loam	852	1.0
208	Gerstle silt loam	7,225	8.7
209	Typic Histoturbels-Histosols complex, gently sloping	462	0.6
210	Histosols-Liscum complex	3,176	3.8
211	Iksgiza peat, undulating	159	0.2
212	Jarvis silt loam, shallow	935	1.1
213	Jarvis silt loam, moderately deep	1,430	1.7
214	Jarvis-Chena complex	6,020	7.3
215	Koyukuk silt loam, rolling	435	0.5
216	Liscum and Mosquito peats	6,971	8.4
217	Lupine silt loam	7,096	8.6
218	Lupine and Moosehead silt loams	1,873	2.3
219	Moosehead silt loam	8,937	10.8
220	Mosquito peat	389	0.5
221	Riverwash	849	1.0
222	Salchaket silt loam	6,156	7.4
223	Tanacross peat	2,294	2.8
224	Tanacross peat, terraces	913	1.1
225	Tetlin silt loam, 3 to 15 percent slopes	174	0.2
226	Tetlin silt loam, 15 to 50 percent slopes	1,300	1.6
227	Typic Eutrocryepts, bedrock substratum, 30 to 60 percent slopes	506	0.6
228	Typic Eutrocryepts, sandy substratum, 20 to 45 percent slopes	176	0.2
229	Typic Eutrocryepts, steep	1,074	1.3
230	Typic Eutrocryepts-Typic Histoturbels complex, steep	2,926	3.5
231	Typic Eutrocryepts-Typic Aquorthels complex, steep	1,998	2.4
232	Volkmar silt loam	1,382	1.7
W	Water	1,519	1.9
	Total	82,800	100.0

Table 5.--Land Capability and Yields per Acre of Crops

(Yields are those that can be expected under a high level of nonirrigated management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil.)

Map symbol and soil name	Land capability	Grass hay	Barley	Green chop	Oats	Pasture	Irish potatoes
		Tons	Bu	Tons	Bu	Aum	Cwt
201:							
Aquic Eutrocryepts	4S	---	---	---	---	---	---
Tanacross	5W	---	---	---	---	---	---
202:							
Aquic Eutrocryepts	3W	---	---	---	---	---	---
Typic Cryaquepts	5W	---	---	---	---	---	---
203:							
Aquic Cryofluvents	4W	---	---	---	---	---	---
Typic Cryaquents	5W	---	---	---	---	---	---
204:							
Beales	6E	---	---	---	---	---	---
Lupine	4S	1.0	25.0	2.5	40.0	---	120.0
205:							
Cryofluvents	5W	---	---	---	---	---	---
206:							
Cryofluvents	3W	---	---	---	---	---	---
207:							
Donnelly	6S	---	---	---	---	---	---
208:							
Gerstle	3C	2.0	60.0	4.8	90.0	---	200.0
209:							
Typic Histoturbels	5W	---	---	---	---	---	---
Histosols	7W	---	---	---	---	---	---
210:							
Histosols	7W	---	---	---	---	---	---
Liscum	5W	---	---	---	---	---	---
211:							
Iksgiza	5W	---	---	---	---	---	---
212:							
Jarvis	4S	1.0	25.0	2.5	40.0	---	120.0
213:							
Jarvis	3S	1.3	40.0	3.1	60.0	---	160.0
214:							
Jarvis	4S	1.0	25.0	2.5	40.0	---	120.0
Chena	6S	---	---	---	---	---	---

Table 5.--Land Capability and Yields per Acre of Crops--Continued

Map symbol and soil name	Land capability	Grass hay	Barley	Green chop	Oats	Pasture	Irish potatoes
		Tons	Bu	Tons	Bu	Aum	Cwt
215:							
Koyukuk	4E	2.0	60.0	4.8	90.0	---	200.0
216:							
Liscum	5W	---	---	---	---	---	---
Mosquito	6W	---	---	---	---	---	---
217:							
Lupine	4S	1.0	25.0	2.5	40.0	---	120.0
218:							
Lupine	4S	1.0	25.0	2.5	40.0	---	120.0
Moosehead	3C	1.3	40.0	3.1	60.0	---	160.0
219:							
Moosehead	3C	1.3	40.0	3.1	60.0	---	160.0
220:							
Mosquito	6W	---	---	---	---	---	---
221:							
Riverwash	8	---	---	---	---	---	---
222:							
Salchaket	3C	1.3	40.0	3.1	60.0	---	160.0
223:							
Tanacross	5W	---	---	---	---	---	---
224:							
Tanacross	5W	---	---	---	---	---	---
225:							
Tetlin	6W	---	---	---	---	---	---
226:							
Tetlin	7E	---	---	---	---	---	---
227:							
Typic Eutrocryepts	7E	---	---	---	---	---	---
228:							
Typic Eutrocryepts	7E	---	---	---	---	---	---
229:							
Typic Eutrocryepts	4E	---	---	---	---	---	---
230:							
Typic Eutrocryepts	4E	---	---	---	---	---	---
Typic Histoturbels	5W	---	---	---	---	---	---

Table 5.--Land Capability and Yields per Acre of Crops--Continued

Map symbol and soil name	Land capability	Grass hay	Barley	Green chop	Oats	Pasture	Irish potatoes
		Tons	Bu	Tons	Bu	Aum	Cwt
231:							
Typic Eutrocryepts	6E	---	---	---	---	---	---
Typic Aquorthels	6E	---	---	---	---	---	---
232:							
Volkmer	3S	1.3	40.0	3.1	60.0	---	160.0
W:							
Water	---	---	---	---	---	---	---

Table 6—Forest Land Productivity

(Only map units with forested soils are listed. Absence of an entry indicates that data was not available.)

Map symbol and soil name	Common trees	Site index	Productivity class
201:			
Aquic Eutrocryepts	Black spruce	---	---
Tanacross	Black spruce	---	---
202:			
Aquic Eutrocryepts	Black spruce	---	---
	Tamarack	---	---
	White spruce	---	---
Typic Cryaquepts	Black spruce	---	---
	Tamarack	---	---
203:			
Aquic Cryofluvents	White spruce	71	2
	Balsam poplar	---	---
	Black spruce	---	---
	Paper birch	---	---
	Tamarack	---	---
204:			
Beales	White spruce	72	2
	Balsam poplar	---	---
	Black spruce	---	---
	Paper birch	---	---
	Quaking aspen	---	---
Lupine	White spruce	72	2
	Balsam poplar	---	---
	Black spruce	---	---
	Paper birch	---	---
	Quaking aspen	---	---
206:			
Cryofluvents	Balsam poplar	---	---
	Black spruce	---	---
	Paper birch	---	---
	White spruce	---	---
207:			
Donnelly	Black spruce	---	---
	Quaking aspen	---	---
	White spruce	---	---
208:			
Gerstle	White spruce	82	2
	Black spruce	---	---
	Quaking aspen	---	---
209:			
Typic Histoturbels	Black spruce	---	---
	Paper birch	---	---
	White spruce	---	---
210:			
Liscum	Black spruce	---	---
	Tamarack	---	---

Table 6—Forest Land Productivity--Continued

Map symbol and soil name	Common trees	Site index	Productivity class
211:			
Iksgiza	Black spruce	---	---
212:			
Jarvis	White spruce	80	2
	Balsam poplar	---	---
	Black spruce	---	---
	Paper birch	---	---
	Quaking aspen	---	---
213:			
Jarvis	White spruce	80	2
	Quaking aspen	60	4
	Paper birch	50	2
214:			
Jarvis	White spruce	80	2
	Balsam poplar	---	---
	Black spruce	---	---
	Paper birch	---	---
	Quaking aspen	---	---
Chena	Balsam poplar	---	---
	Paper birch	---	---
	Quaking aspen	---	---
	White spruce	---	---
215:			
Koyukuk	White spruce	83	2
	Paper birch	60	3
	Black spruce	---	---
	Quaking aspen	---	---
216:			
Liscum	Black spruce	---	---
	Tamarack	---	---
Mosquito	Black spruce	---	---
	Paper birch	---	---
	Tamarack	---	---
217:			
Lupine	White spruce	72	2
	Balsam poplar	---	---
	Black spruce	---	---
	Paper birch	---	---
	Quaking aspen	---	---
218:			
Lupine	White spruce	72	2
	Balsam poplar	---	---
	Black spruce	---	---
	Paper birch	---	---
	Quaking aspen	---	---
Moosehead	White spruce	82	2
	Balsam poplar	---	---
	Black spruce	---	---
	Paper birch	---	---
	Quaking aspen	---	---

Table 6—Forest Land Productivity--Continued

Map symbol and soil name	Common trees	Site index	Productivity class
219:			
Moosehead	White spruce	82	2
	Balsam poplar	---	---
	Black spruce	---	---
	Paper birch	---	---
	Quaking aspen	---	---
220:			
Mosquito	Black spruce	---	---
	Paper birch	---	---
	Tamarack	---	---
222:			
Salchaket	White spruce	80	2
	Balsam poplar	---	---
	Black spruce	---	---
	Paper birch	---	---
	Quaking aspen	---	---
223:			
Tanacross	Black spruce	---	---
224:			
Tanacross	Black spruce	---	---
225:			
Tetlin	White spruce	71	2
	Black spruce	---	---
	Paper birch	---	---
226:			
Tetlin	White spruce	71	2
	Black spruce	---	---
	Paper birch	---	---
227:			
Typic Eutrocryepts	White spruce	86	3
	Paper birch	51	2
	Balsam poplar	---	---
	Quaking aspen	---	---
228:			
Typic Eutrocryepts	White spruce	85	3
	Paper birch	51	2
229:			
Typic Eutrocryepts	White spruce	85	3
	Paper birch	51	2
230:			
Typic Eutrocryepts	White spruce	85	3
	Paper birch	51	2
Typic Histoturbels	Black spruce	---	---
	Paper birch	---	---
	White spruce	---	---

Table 6—Forest Land Productivity--Continued

Map symbol and soil name	Common trees	Site index	Productivity class
231:			
Typic Eutrocryepts	White spruce	85	3
	Paper birch	51	2
Typic Aquorthels	White spruce	64	1
	Paper birch	38	1
	Black spruce	---	---
232:			
Volkmar	Black spruce	---	---
	Quaking aspen	---	---
	White spruce	---	---

Table 7.--Forest Land Management

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that data were not available.)

Map symbol and soil name	Ordination symbol	Management concerns				
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition
201:						
Aquic Eutrocryepts	2D	Moderate	Moderate	Moderate	Moderate	Moderate.
Tanacross	1W	Severe	Severe	Severe	Moderate	Moderate.
203:						
Aquic Cryofluvents	2A	Slight	Moderate	Slight	Moderate	Slight.
204:						
Beales	2R	Severe	Moderate	Severe	Severe	Slight.
Lupine	2D	Slight	Slight	Slight	Moderate	Slight.
206:						
Cryofluvents	2A	Slight	Slight	Slight	Moderate	Slight.
207:						
Donnelly	---	Slight	Severe	Moderate	Moderate	Slight.
208:						
Gerstle	2A	Slight	Slight	Slight	Moderate	Slight.
209:						
Typic Cryaquents	1W	Severe	Severe	Severe	Severe	Severe.
211:						
Iksgiza	1W	Severe	Severe	Severe	Moderate	Moderate.
212:						
Jarvis	2D	Slight	Slight	Slight	Moderate	Slight.
213:						
Jarvis	2A	Slight	Slight	Slight	Moderate	Slight.
214:						
Jarvis	2D	Slight	Slight	Slight	Moderate	Slight.
Chena	1F	Slight	Slight	Severe	Severe	Slight.
215:						
Koyukuk	2R	Moderate	Moderate	Slight	Moderate	Moderate.
216:						
Liscum	0W	Severe	Severe	Severe	Moderate	Severe.
Mosquito	0W	Severe	Severe	Severe	Moderate	Severe.
217:						
Lupine	2D	Slight	Slight	Slight	Moderate	Slight.
218:						
Lupine	2D	Slight	Slight	Slight	Moderate	Slight.
Moosehead	2A	Slight	Slight	Slight	Moderate	Slight.
219:						
Moosehead	2A	Slight	Slight	Slight	Moderate	Slight.

Table 7.--Forest Land Management--Continued

Map symbol and soil name	Ordination symbol	Management concerns				
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition
220:						
Mosquito	0W	Severe	Severe	Severe	Moderate	Severe.
222:						
Salchaket	2A	Slight	Slight	Slight	Moderate	Slight.
225:						
Tetlin	2W	Moderate	Severe	Moderate	Moderate	Moderate.
226:						
Tetlin	2R	Severe	Severe	Moderate	Moderate	Moderate.
227:						
Typic Eutrocryepts	3R	Severe	Severe	Slight	Moderate	Slight.
228:						
Typic Eutrocryepts	3R	Severe	Severe	Slight	Moderate	Moderate.
229:						
Typic Eutrocryepts	3E	Severe	Moderate	Slight	Moderate	Moderate.
230:						
Typic Eutrocryepts	3E	Severe	Moderate	Slight	Moderate	Moderate.
Typic Histoturbels	1W	Severe	Severe	Severe	Severe	Severe.
231:						
Typic Eutrocryepts	3R	Severe	Severe	Slight	Moderate	Moderate.
Typic Aquorthels	1R	Severe	Moderate	Moderate	Moderate	Slight.
232:						
Volkmar	2D	Slight	Moderate	Slight	Moderate	Slight.

Table 8.--Soil Limitations and Hazards for Unsurfaced Forest Roads

(See text for a description of the limitations and hazards listed in this table.)

Map symbol and soil name	Limitations and hazards
201:	
Aquic Eutrocryepts	Dusty when dry Low strength when wet Slippery when wet
Tanacross	Low strength, organics Permafrost Slippery when wet Wetness
202:	
Aquic Eutrocryepts	Dusty when dry Low strength when wet Slippery when wet
Typic Cryaquepts	Dusty when dry Slippery when wet Wetness
203:	
Aquic Cryofluvents	Dusty when dry Slippery when wet
Typic Cryaquents	Flooding Low strength when dry Slippery when wet Wetness
204:	
Beales	Dusty when dry Low strength when dry Slippery when wet Steep slope
Lupine	Dusty when dry Slippery when wet
205:	
Cryofluvents	Flooding Low strength when wet Slippery when wet Wetness
206:	
Cryofluvents	Dusty when dry Low strength when dry Slippery when wet
207:	
Donnelly	Dusty when dry Slippery when wet
208:	
Gerstle	Dusty when dry Low strength when wet Slippery when wet

Table 8.--Soil Limitations and Hazards for Unsurfaced Forest Roads--Continued

Map symbol and soil name	Limitations and hazards
209:	
Typic Histoturbels	Low strength when wet Permafrost Slippery when wet Wetness
Histosols	Permafrost Wetness
210:	
Histosols	Low strength, organics Wetness
Liscum	Low strength, organics Slippery when wet Wetness
211:	
Iksgiza	Low strength, organics Permafrost Slippery when wet Wetness
212:	
Jarvis	Dusty when dry Low strength when wet Slippery when wet
213:	
Jarvis	Dusty when dry Low strength when wet Slippery when wet
214:	
Jarvis	Dusty when dry Slippery when wet
Chena	None
215:	
Koyukuk	Dusty when dry Low strength when wet Moderate slope Slippery when wet
216:	
Liscum	Low strength, organics Slippery when wet Wetness
Mosquito	Low strength, organics Permafrost Slippery when wet Wetness
217:	
Lupine	Dusty when dry Low strength when wet Slippery when wet

Table 8.--Soil Limitations and Hazards for Unsurfaced Forest Roads--Continued

Map symbol and soil name	Limitations and hazards
218:	
Lupine	Dusty when dry Low strength when wet Slippery when wet
Moosehead	Dusty when dry Low strength when wet Slippery when wet
219:	
Moosehead	Dusty when dry Low strength when wet Slippery when wet
220:	
Mosquito	Low strength, organics Permafrost Slippery when wet Wetness
221:	
Riverwash	Onsite investigation required.
222:	
Salchaket	Dusty when dry Slippery when wet
223:	
Tanacross	Low strength, organics Permafrost Slippery when wet Wetness
224:	
Tanacross	Low strength, organics Permafrost Slippery when wet Wetness
225:	
Tetlin	Dusty when dry Low strength when wet Moderate slope Permafrost Slippery when wet Wetness
226:	
Tetlin	Very steep slope
227:	
Typic Eutrocryepts	Very steep slope
228:	
Typic Eutrocryepts	Dusty when dry Low strength when wet Slippery when wet Steep slope

Table 8.--Soil Limitations and Hazards for Unsurfaced Forest Roads--Continued

Map symbol and soil name	Limitations and hazards
229:	
Typic Eutrocryepts	Dusty when dry Low strength when wet Slippery when wet Steep slope
230:	
Typic Eutrocryepts	Dusty when dry Low strength, organics Slippery when wet Steep slope
Typic Histoturbels	Low strength, organics Moderate slope Permafrost Slippery when wet Wetness
231:	
Typic Eutrocryepts	Very steep slope
Typic Aquorthels	Dusty when dry Low strength when wet Permafrost Slippery when wet Steep slope Wetness
232:	
Volkmar	Dusty when dry Low strength when wet Slippery when wet
W.	
Water	

Table 9.--Recreational Development

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated.)

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
201*:				
Aquic Eutrocryepts	Severe: flooding.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
Tanacross	Severe: permafrost, flooding, wetness.	Severe: permafrost, wetness, excess humus.	Severe: permafrost, excess humus, wetness.	Severe: permafrost, wetness, excess humus.
202*:				
Aquic Eutrocryepts	Severe: flooding.	Moderate: wetness.	Moderate: wetness.	Slight.
Typic Cryaquepts	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
203*:				
Aquic Cryofluvents	Severe: flooding.	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Slight.
Typic Cryaquents	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
204*:				
Beales	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.
Lupine	Severe: flooding.	Slight	Slight	Slight.
205 Cryofluvents	Severe: flooding, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.
206 Cryofluvents	Severe: flooding.	Slight	Slight	Slight.
207 Donnelly	Slight	Slight	Moderate: small stones.	Severe: erodes easily.
208 Gerstle	Severe: flooding.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
209*:				
Typic Histoturbels	Severe: permafrost, wetness.	Severe: permafrost, wetness.	Severe: permafrost, excess humus.	Severe: permafrost, wetness, excess humus.
Histosols	Severe: permafrost, ponding.	Severe: permafrost, ponding, excess humus.	Severe: permafrost, excess humus, ponding.	Severe: permafrost, ponding, excess humus.

See footnote at end of table.

Table 9.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
210*:				
Histosols	Severe: flooding, ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.
Liscum	Severe: flooding, wetness, excess humus.	Severe: wetness, excess humus.	Severe: excess humus, wetness.	Severe: wetness, excess humus.
211 Iksgiza	Severe: permafrost, wetness.	Severe: permafrost, wetness.	Severe: permafrost, excess humus.	Severe: permafrost, wetness, excess humus.
212, 213 Jarvis	Severe: flooding.	Slight	Slight	Slight.
214*:				
Jarvis	Severe: flooding.	Slight	Slight	Slight.
Chena	Severe: flooding.	Slight	Slight	Slight.
215 Koyukuk	Slight	Slight	Severe: slope.	Severe: erodes easily.
216*:				
Liscum	Severe: flooding, wetness, excess humus.	Severe: wetness, excess humus.	Severe: excess humus, wetness.	Severe: wetness, excess humus.
Mosquito	Severe: permafrost, flooding, ponding.	Severe: permafrost, ponding, excess humus.	Severe: permafrost, excess humus, ponding.	Severe: permafrost, ponding, excess humus.
217 Lupine	Severe: flooding.	Slight	Slight	Slight.
218*:				
Lupine	Severe: flooding.	Slight	Slight	Slight.
Moosehead	Severe: flooding.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
219 Moosehead	Severe: flooding.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
220 Mosquito	Severe: permafrost, flooding, ponding.	Severe: permafrost, ponding, excess humus.	Severe: permafrost, excess humus, ponding.	Severe: permafrost, ponding, excess humus.
221. Riverwash				

See footnote at end of table.

Table 9.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
222--Salchaket	Severe: flooding.	Slight	Slight	Slight.
223--Tanacross	Severe: permafrost, flooding, wetness.	Severe: permafrost, wetness, excess humus.	Severe: permafrost, excess humus, wetness.	Severe: permafrost, wetness, excess humus.
224--Tanacross	Severe: permafrost, wetness.	Severe: permafrost, wetness, excess humus.	Severe: permafrost, excess humus, wetness.	Severe: permafrost, wetness, excess humus.
225--Tetlin	Severe: permafrost, wetness.	Severe: permafrost, wetness.	Severe: permafrost, slope, wetness.	Severe: permafrost, wetness.
226--Tetlin	Severe: permafrost, slope, wetness.	Severe: permafrost, slope, wetness.	Severe: permafrost, slope, wetness.	Severe: permafrost, wetness, slope.
227--Typic Eutrocryepts	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, erodes easily.
228--Typic Eutrocryepts	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.
229--Typic Eutrocryepts	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.
230*:				
Typic Eutrocryepts	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.
Typic Histoturbels	Severe: permafrost, wetness.	Severe: permafrost, wetness.	Severe: permafrost, slope, excess humus.	Severe: permafrost, wetness, excess humus.
231*:				
Typic Eutrocryepts	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.
Typic Aquorthels	Severe: permafrost, slope, wetness.	Severe: permafrost, slope, wetness.	Severe: permafrost, slope, wetness.	Severe: permafrost, wetness.
232--Volkmar	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
W. Water				

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 10.--Building Site Development

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation.)

Soil name and map symbol	Shallow excavations	Dwellings without basements	Small commercial buildings	Local roads and streets
201*:				
Aquic Eutrocryepts	Severe: cutbanks cave, wetness.	Severe: flooding.	Severe: flooding.	Severe: frost action.
Tanacross	Severe: permafrost, wetness.	Severe: permafrost, flooding, wetness.	Severe: permafrost, flooding, wetness.	Severe: permafrost, wetness, frost action.
202*:				
Aquic Eutrocryepts	Severe: cutbanks cave, wetness.	Severe: flooding.	Severe: flooding.	Severe: frost action.
Typic Cryaquepts	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, frost action.
203*:				
Aquic Cryofluvents	Severe: cutbanks cave, wetness.	Severe: flooding.	Severe: flooding.	Moderate: wetness, flooding.
Typic Cryaquents	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding, frost action.
204*:				
Beales	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.
Lupine	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
205	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, flooding, frost action.
206	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: frost action.
207	Severe: cutbanks cave.	Slight	Slight	Moderate: frost action.
208	Severe: cutbanks cave, wetness.	Severe: flooding.	Severe: flooding.	Moderate: wetness, flooding, frost action.

See footnote at end of table.

Table 10.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Small commercial buildings	Local roads and streets
209*:				
Typic Histoturbels	Severe: permafrost, wetness.	Severe: permafrost, wetness, low strength.	Severe: permafrost, wetness.	Severe: permafrost, wetness.
Histosols	Severe: permafrost, ponding.	Severe: permafrost, subsides.	Severe: permafrost, subsides.	Severe: permafrost, subsides, ponding.
210*:				
Histosols	Severe: ponding.	Severe: subsides, flooding, ponding.	Severe: subsides, flooding, ponding.	Severe: subsides, ponding, frost action.
Liscum	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, frost action.
211 Iksgiza	Severe: permafrost, wetness.	Severe: permafrost, wetness, low strength.	Severe: permafrost, wetness.	Severe: permafrost, wetness.
212, 213 Jarvis	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Moderate: flooding, frost action.
214*:				
Jarvis	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Moderate: flooding, frost action.
Chena	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Moderate: flooding, large stones.
215 Koyukuk	Moderate: cutbanks cave.	Slight	Moderate: slope.	Severe: frost action.
216*:				
Liscum	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, frost action.
Mosquito	Severe: permafrost, ponding.	Severe: permafrost, flooding, ponding.	Severe: permafrost, flooding, ponding.	Severe: permafrost, ponding, frost action.
217 Lupine	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
218*:				
Lupine	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Moderate: flooding.

See footnote at end of table.

Table 10.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Small commercial buildings	Local roads and streets
218*: Moosehead	Severe: cutbanks cave, wetness.	Severe: flooding.	Severe: flooding.	Moderate: wetness, flooding, frost action.
219--- Moosehead	Severe: cutbanks cave, wetness.	Severe: flooding.	Severe: flooding.	Moderate: wetness, flooding, frost action.
220--- Mosquito	Severe: permafrost, ponding.	Severe: permafrost, flooding, ponding.	Severe: permafrost, flooding, ponding.	Severe: permafrost, ponding, frost action.
221. Riverwash				
222--- Salchaket	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Moderate: flooding, frost action.
223--- Tanacross	Severe: permafrost, wetness.	Severe: permafrost, flooding, wetness.	Severe: permafrost, flooding, wetness.	Severe: permafrost, wetness, frost action.
224--- Tanacross	Severe: permafrost, wetness.	Severe: permafrost, wetness.	Severe: permafrost, wetness.	Severe: permafrost, wetness, frost action.
225--- Tetlin	Severe: permafrost, wetness.	Severe: permafrost, wetness.	Severe: permafrost, wetness, slope.	Severe: permafrost, wetness.
226--- Tetlin	Severe: permafrost, wetness, slope.	Severe: permafrost, wetness, slope.	Severe: permafrost, wetness, slope.	Severe: permafrost, wetness, slope.
227--- Typic Eutrocryepts	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock, slope.
228--- Typic Eutrocryepts	Severe: depth to rock, cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.
229--- Typic Eutrocryepts	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.
230*: Typic Eutrocryepts	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

Table 10.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Small commercial buildings	Local roads and streets
230*: Typic Histoturbels	Severe: permafrost, wetness.	Severe: permafrost, wetness, low strength.	Severe: permafrost, wetness, slope.	Severe: permafrost, wetness.
231*: Typic Eutrocryepts	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.
Typic Aquorthels	Severe: permafrost, wetness, slope.	Severe: permafrost, wetness, slope.	Severe: permafrost, wetness, slope.	Severe: permafrost, wetness, slope.
232--- Volkmar	Severe: cutbanks cave, wetness.	Moderate: wetness.	Moderate: wetness.	Severe: frost action.
W. Water				

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 11.--Sanitary Facilities

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "good," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation.)

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
201*:					
Aquic Eutrocryepts	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
Tanacross	Severe: permafrost, wetness.	Severe: permafrost, excess humus, wetness.	Severe: permafrost, wetness, excess humus.	Severe: permafrost, wetness.	Poor: permafrost, hard to pack, wetness.
202*:					
Aquic Eutrocryepts	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, small stones.
Typic Cryaquepts	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: wetness.	Poor: wetness.
203*:					
Aquic Cryofluvents	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too sandy.	Severe: wetness.	Poor: too sandy.
Typic Cryaquents	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy, wetness.
204*:					
Beales	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, slope.
Lupine	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
205 Cryofluvents	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: too sandy, wetness.
206 Cryofluvents	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.

See footnote at end of table.

Table 11.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
207--Donnelly	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
208--Gerstle	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: flooding, wetness.	Fair: too sandy, wetness.
209*:					
Typic Histoturbels	Severe: permafrost, wetness.	Severe: permafrost, excess humus.	Severe: permafrost, wetness.	Severe: permafrost, wetness.	Poor: permafrost, hard to pack.
Histosols	Severe: permafrost, ponding.	Severe: permafrost, seepage, excess humus.	Severe: permafrost, seepage, ponding.	Severe: permafrost, ponding.	Poor: permafrost, ponding, excess humus.
210*:					
Histosols	Severe: ponding.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding, excess humus.	Severe: ponding.	Poor: ponding, excess humus.
Liscum	Severe: wetness.	Severe: excess humus, wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
211--Iksgiza	Severe: permafrost, wetness.	Severe: permafrost, excess humus.	Severe: permafrost, wetness.	Severe: permafrost, wetness.	Poor: permafrost, hard to pack.
212, 213--Jarvis	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
214*:					
Jarvis	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
Chena	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy, large stones.	Severe: seepage.	Poor: seepage, too sandy, small stones.
215--Koyukuk	Moderate: percs slowly.	Severe: slope.	Slight	Slight	Good.
216*:					
Liscum	Severe: wetness.	Severe: seepage, excess humus, wetness.	Severe: seepage, wetness, too sandy.	Severe: wetness.	Poor: too sandy, wetness.

See footnote at end of table.

Table 11.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
216*:					
Mosquito	Severe: permafrost, ponding.	Severe: permafrost, excess humus, ponding.	Severe: permafrost, ponding, excess humus.	Severe: permafrost, ponding.	Poor: permafrost, hard to pack, ponding.
217	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
218*:					
Lupine	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
Moosehead	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
219	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
220	Severe: permafrost, ponding.	Severe: permafrost, excess humus, ponding.	Severe: permafrost, ponding, excess humus.	Severe: permafrost, ponding.	Poor: permafrost, hard to pack, ponding.
221. Riverwash					
222	Moderate: flooding, percs slowly.	Moderate: seepage.	Severe: too sandy.	Moderate: flooding.	Fair: too sandy.
223, 224	Severe: permafrost, wetness.	Severe: permafrost, excess humus, wetness.	Severe: permafrost, wetness, too acid.	Severe: permafrost, wetness.	Poor: permafrost, wetness.
225	Severe: permafrost, wetness.	Severe: permafrost, slope, wetness.	Severe: permafrost, wetness.	Severe: permafrost, wetness.	Poor: permafrost, wetness.
226	Severe: permafrost, wetness, slope.	Severe: permafrost, slope, wetness.	Severe: permafrost, wetness, slope.	Severe: permafrost, wetness, slope.	Poor: permafrost, slope, wetness.
227	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, slope.

See footnote at end of table.

Table 11.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
228---------- Typic Eutrocryepts	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, seepage, too sandy.
229---------- Typic Eutrocryepts	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: seepage, slope.
230*: Typic Eutrocryepts	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: seepage, slope.
Typic Histoturbels	Severe: permafrost, wetness.	Severe: permafrost, slope, excess humus.	Severe: permafrost, wetness.	Severe: permafrost, wetness.	Poor: permafrost, hard to pack.
231*: Typic Eutrocryepts	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: seepage, slope.
Typic Aquorthels---	Severe: permafrost, wetness, slope.	Severe: permafrost, slope, wetness.	Severe: permafrost, wetness, slope.	Severe: permafrost, wetness, slope.	Poor: permafrost, slope, wetness.
232---------- Volkmar	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
W. Water					

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 12.--Construction Materials

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation.)

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
201*:				
Aquic Eutrocryepts	Fair: large stones, wetness.	Probable	Probable	Poor: too sandy, small stones, area reclaim.
Tanacross	Poor: permafrost, wetness.	Improbable: permafrost, excess fines.	Improbable: permafrost, excess fines.	Poor: permafrost, excess humus, wetness.
202*:				
Aquic Eutrocryepts	Fair: large stones, wetness.	Probable	Probable	Poor: too sandy, small stones, area reclaim.
Typic Cryaquepts	Poor: wetness.	Probable	Probable	Poor: wetness.
203*:				
Aquic Cryofluvents	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy.
Typic Cryaquents	Poor: wetness.	Probable	Probable	Poor: too sandy, wetness.
204*:				
Beales	Fair: slope.	Probable	Improbable: too sandy.	Poor: too sandy, slope.
Lupine	Good	Probable	Probable	Poor: too sandy, small stones, area reclaim.
205 Cryofluvents	Fair: wetness.	Probable	Probable	Poor: too sandy, area reclaim.
206 Cryofluvents	Good	Probable	Probable	Poor: too sandy, small stones, area reclaim.
207 Donnelly	Good	Probable	Probable	Poor: too sandy, small stones, area reclaim.
208 Gerstle	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too sandy.

See footnote at end of table.

Table 12.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
209*:				
Typic Histoturbels	Poor: permafrost, wetness.	Improbable: permafrost, excess fines.	Improbable: permafrost, excess fines.	Poor: permafrost, excess humus, wetness.
Histosols	Poor: permafrost, wetness.	Improbable: permafrost, excess humus.	Improbable: permafrost, excess humus.	Poor: permafrost, excess humus, wetness.
210*:				
Histosols	Poor: thin layer, wetness.	Improbable: excess humus.	Improbable: excess humus.	Poor: excess humus, wetness.
Liscum	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.
211--Iksgiza	Poor: permafrost, wetness.	Improbable: permafrost, excess fines.	Improbable: permafrost, excess fines.	Poor: permafrost, excess humus, wetness.
212, 213--Jarvis	Good	Probable	Probable	Poor: too sandy, small stones, area reclaim.
214*:				
Jarvis	Good	Probable	Probable	Poor: too sandy, small stones, area reclaim.
Chena	Fair: large stones.	Probable	Probable	Poor: too sandy, small stones, area reclaim.
215--Koyukuk	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
216*:				
Liscum	Poor: wetness.	Probable	Probable	Poor: too sandy, wetness.
Mosquito	Poor: permafrost, wetness.	Improbable: permafrost, excess fines.	Improbable: permafrost, excess fines.	Poor: permafrost, excess humus, wetness.
217--Lupine	Good	Probable	Probable	Poor: too sandy, small stones, area reclaim.

See footnote at end of table.

Table 12.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
218*:				
Lupine	Good	Probable	Probable	Poor: too sandy, small stones, area reclaim.
Moosehead	Fair: wetness.	Probable	Probable	Poor: small stones, area reclaim.
219 Moosehead	Fair: wetness.	Probable	Probable	Poor: small stones, area reclaim.
220 Mosquito	Poor: permafrost, wetness.	Improbable: permafrost, excess fines.	Improbable: permafrost, excess fines.	Poor: permafrost, excess humus, wetness.
221. Riverwash				
222 Salchaket	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy.
223, 224 Tanacross	Poor: permafrost, wetness.	Improbable: permafrost, excess fines.	Improbable: permafrost, excess fines.	Poor: permafrost, excess humus, wetness.
225 Tetlin	Poor: permafrost, wetness.	Improbable: permafrost, excess fines.	Improbable: permafrost, excess fines.	Poor: permafrost, wetness.
226 Tetlin	Poor: permafrost, wetness, slope.	Improbable: permafrost, excess fines.	Improbable: permafrost, excess fines.	Poor: permafrost, wetness, slope.
227 Typic Eutrocryepts	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
228 Typic Eutrocryepts	Poor: depth to rock, slope.	Improbable: thin layer.	Improbable: too sandy.	Poor: area reclaim, too sandy, slope.
229 Typic Eutrocryepts	Fair: slope.	Improbable: thin layer.	Improbable: too sandy.	Poor: area reclaim, slope.
230*:				
Typic Eutrocryepts	Fair: slope.	Improbable: thin layer.	Improbable: too sandy.	Poor: area reclaim, slope.
Typic Histoturbels	Poor: permafrost, wetness.	Improbable: permafrost, excess fines.	Improbable: permafrost, excess fines.	Poor: permafrost, excess humus, wetness.

See footnote at end of table.

Table 12.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
231*:				
Typic Eutrocryepts	Poor: slope.	Improbable: thin layer.	Improbable: too sandy.	Poor: area reclaim, slope.
Typic Aquorthels	Poor: permafrost, wetness.	Improbable: permafrost, excess fines.	Improbable: permafrost, excess fines.	Poor: permafrost, wetness, slope.
232 Volkmar	Fair: wetness.	Probable	Probable	Poor: too sandy, small stones, area reclaim.
W. Water				

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 13.--Water Management

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "sligh
"moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in
indicates the dominant soil condition but does not eliminate the need for onsite investigation.)

Soil name and map symbol	Limitations for---			Features affecting---		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions
201*:						
Aquic Eutrocryepts	Severe: seepage.	Severe: seepage.	Severe: no water.	Large stones, frost action, cutbanks cave.	Large stones, wetness, droughty.	Large stones, erodes easily, wetness.
Tanacross	Severe: permafrost.	Severe: permafrost, piping, excess humus.	Severe: no water.	Permafrost, subsides, frost action.	Permafrost, wetness, too acid.	Permafrost, erodes easily, wetness.
202*:						
Aquic Eutrocryepts	Severe: seepage.	Severe: seepage.	Severe: cutbanks cave.	Large stones, frost action, cutbanks cave.	Large stones, wetness, droughty.	Large stones, erodes easily, wetness.
Typic Cryaquepts	Severe: seepage.	Severe: piping, wetness.	Severe: cutbanks cave.	Frost action---	Wetness, erodes easily.	Erodes easily, wetness.
203*:						
Aquic Cryofluvents	Slight-------	Severe: piping.	Severe: slow refill, cutbanks cave.	Cutbanks cave	Wetness, soil blowing, erodes easily.	Erodes easily, wetness, too sandy.
Typic Cryaquents	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Flooding, frost action, cutbanks cave.	Wetness, droughty, erodes easily.	Erodes easily, wetness, too sandy.
204*:						
Beales	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, droughty, soil blowing.	Slope, erodes easily, too sandy.

See footnote at end of table.

Table 13.--Water Management--Continued

Soil name and map symbol	Limitations for---			Features affecting---		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions
204*:						
Lupine	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Droughty, soil blowing, erodes easily.	Erodes easily, too sandy, soil blowing.
205---------- Cryofluvents	Severe: seepage.	Severe: piping, wetness.	Severe: cutbanks cave.	Flooding, frost action, cutbanks cave.	Wetness, soil blowing, erodes easily.	Erodes easily, wetness, too sandy.
206---------- Cryofluvents	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, soil blowing, erodes easily.	Erodes easily, too sandy, soil blowing.
207---------- Donnelly	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Droughty, soil blowing.	Erodes easily, too sandy.
208---------- Gerstle	Moderate: seepage.	Severe: piping.	Severe: no water.	Cutbanks cave	Wetness, soil blowing, erodes easily.	Erodes easily, wetness, soil blowing.
209*:						
Typic Histoturbels	Severe: permafrost.	Severe: permafrost, piping, excess humus.	Severe: no water.	Permafrost, subsides, frost action.	Permafrost, wetness.	Permafrost, erodes easily.
Histosols	Severe: permafrost.	Severe: permafrost, excess humus, ponding.	Severe: permafrost.	Permafrost, ponding, subsides.	Permafrost, ponding.	Permafrost, ponding.
210*:						
Histosols	Slight	Severe: excess humus, ponding.	Slight	Ponding, subsides, frost action.	Ponding	Ponding
Liscum	Moderate: seepage.	Severe: piping, wetness.	Moderate: slow refill.	Subsides, frost action.	Wetness	Erodes easily, wetness.

See footnote at end of table.

Table 13.--Water Management--Continued

Soil name and map symbol	Limitations for---			Features affecting---		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions
211---------- Iksgiza	Severe: permafrost.	Severe: permafrost, piping, excess humus.	Severe: no water.	Permafcrost, subsides, frost action.	Permafrost, slope, wetness.	Permafrost, erodes easily
212,213---------- Jarvis	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Soil blowing, erodes easily.	Large stones, erodes easily too sandy.
214*: Jarvis----------	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Soil blowing, erodes easily.	Large stones, erodes easily too sandy.
Chena----------	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Large stones, droughtly.	Large stones, erodes easily too sandy.
215---------- Koyukuk	Moderate: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope,ty, soil blowing, erodes easily.	Erodes easily, soil blowing.
216*: Liscum----------	Severe: seepage.	Severe: piping, wetness.	Severe: cutbanks cave.	Subsides, frost action. cutbanks cave.	Wetness--------	Erodes easily, wetness, too sandy.
Mosquito----------	Severe: permafrost.	Severe: permafrost, piping, excess humus.	Severe: no water.	Permafcrost, ponding, subsides.	Permafrost, ponding.	Permafrost, erodes easily ponding.
217---------- Lupine	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Droughty, soil blowing, erodes easily.	Erodes easily, too sandy, soil blowing.
218*: Lupine----------	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Droughty, soil blowing, erodes easily.	Erodes easily, too sandy, soil blowing.

See footnote at end of table.

Table 13.--Water Management--Continued

Soil name and map symbol	Limitations for---			Features affecting---		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions
218*: Moosehead	Severe: seepage.	Severe: seepage.	Severe: no water.	Cutbanks cave	Wetness, soil blowing, erodes easily.	Erodes easily, wetness, too sandy.
219--- Moosehead	Severe: seepage.	Severe: seepage.	Severe: no water.	Cutbanks cave	Wetness, soil blowing, erodes easily.	Erodes easily, wetness, too sandy.
220--- Mosquito	Severe: permafrost.	Severe: permafrost, piping, excess humus.	Severe: no water.	Permafrost, ponding, subsides.	Permafrost, ponding.	Permafrost, erodes easily, ponding.
221. Riverwash						
222--- Salchaket	Moderate: seepage.	Severe: piping.	Severe: no water.	Deep to water	Soil blowing---	Erodes easily, soil blowing.
223, 224--- Tanacross	Severe: permafrost.	Severe: permafrost, piping, wetness.	Severe: no water.	Permafrost, subsides, frost action.	Permafrost, wetness.	Permafrost, erodes easily, wetness.
225, 226--- Tetlin	Severe: permafrost, slope.	Severe: permafrost, piping, wetness.	Severe: no water.	Permafrost, frost action, slope.	Permafrost, slope, wetness.	Permafrost, slope, erodes easily.
227--- Typic Eutrocryepts	Severe: depth to rock slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, soil blowing, depth to rock.	Slope, depth to rock, erodes easily.
228--- Typic Eutrocryepts	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, soil blowing, depth to rock.	Slope, depth to rock, erodes easily.
229--- Typic Eutrocryepts	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, droughty, soil blowing.	Slope, erodes easily, soil blowing.

See footnote at end of table.

Table 13.--Water Management--Continued

Soil name and map symbol	Limitations for---			Features affecting---			
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions	Grassed waterways
230*:							
Typic Eutrocryepts	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, droughty, soil blowing.	Slope, erodes easily, soil blowing.	Slope, erodes easily, droughty.
Typic Histoturbels	Severe: permafrost, slope.	Severe: permafrost, piping, excess humus.	Severe: no water.	Permafcrost, subsides, frost action.	Permafrost, slope, wetness.	Permafrost, slope, erodes easily,	Permafrost, wetness, slope.
231:							
Typic Eutrocryepts	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, droughty, soil blowing.	Slope, erodes easily, soil blowing.	Slope, erodes easily, droughty.
Typic Aquorthels	Severe: permafrost, slope.	Severe: permafrost, piping, wetness.	Severe: no water.	Permafcrost, frost action, slope.	Permafrost, slope, wetness.	Permafrost, slope, erodes easily,	Permafrost, wetness, slope.
232---------- Volkmar	Severe: seepage.	Severe: seepage.	Severe: no water.	Frost action, cutbanks cave.	Wetness, soil blowing.	Erodes easily, wetness, sandy.	Erodes easily,
W. Water							

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 14—Engineering Index Properties

(The symbol < means less than; > means more than. Absence of an entry indicates that data was not estimated.)

Soil name and map symbol	Depth	USDA texture	Classification		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	4	10	40	200		
	In								Pct	
201*:										
Aquic Eutrocryepts---	0-2	Silt loam--------	ML, OL, MH, OH	A-4, A-5	100	100	90-100	70-90	30-100	NP-10
	2-18	Stratified silt loam to fine sand.	ML	A-4	100	90-100	80-100	65-75	10-15	NP-5
	18-60	Extremely gravelly sand, very gravelly sand, gravelly sand.	GW, SW	A-1	40-70	20-50	5-20	0-5	---	NP
Tanacross-------	8-0	Peat-------------	PT	A-8	---	---	---	---	---	---
	0-6	Mucky silt loam	ML, OL	A-4	100	100	80-100	70-90	30-40	NP-10
	6-22	Stratified silt loam to fine sandy loam.	ML	A-4	100	100	80-100	70-90	30-40	NP-10
	22-40	Ice or frozen soil.	---	---	---	---	---	---	---	---
202*:										
Aquic Eutrocryepts---	0-7	Silt loam--------	ML, OL, MH, OH	A-4, A-5	100	100	90-100	70-90	30-100	NP-10
	7-33	Stratified silt loam to fine sand.	ML	A-4	100	90-100	80-100	65-75	15-35	NP-5
	33-60	Extremely gravelly sand, very gravelly sand, gravelly sand.	GW, SW	A-1	40-70	20-50	5-20	0-5	---	NP
Typic Cryaquepts	0-5	Silt loam--------	ML	A-4, A-7	100	100	95-100	85-95	30-50	NP-20
	5-61	Silt loam, very fine sandy loam.	ML	A-4, A-7	100	100	95-100	85-95	30-50	NP-20
	61-65	Very gravelly sand, extremely gravelly sand, sand.	GW, SW, GP, SP	A-1	30-100	20-90	10-40	0-5	---	NP
203*:										
Aquic Cryofluvents---	0-2	Silt loam--------	ML	A-4	100	100	95-100	65-75	25-30	NP-5
	2-60	Stratified silty clay loam to sand.	SC, CL, ML, SM	A-4, A-2	100	100	80-100	30-80	0-30	NP-10
Typic Cryaquents	0-1	Silty clay loam	ML	A-4	100	100	85-95	80-90	25-30	NP-5
	1-60	Stratified silt loam to sand.	ML, SM, SW, SP	A-2, A-3, A-4	100	100	50-100	0-90	0-40	NP-10

See footnote at end of table.

Table 14—Engineering Index Properties—Continued

Soil name and map symbol	Depth	USDA texture	Classification		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	4	10	40	200		
	In								Pct	
204*:										
Beales	0-2	Silt loam	ML	A-4	100	100	90-95	75-90	30-40	NP-10
	2-60	Stratified silt loam to sand.	SP-SM, SM	A-2, A-3	100	100	85-90	5-25	---	NP
Lupine	0-4	Silt loam	ML	A-4	100	100	90-100	70-90	15-35	NP-5
	4-12	Silt loam	ML	A-4	100	95-100	80-90	50-75	25-35	NP-10
	12-60	Extremely gravelly sand.	GP, GW	A-1	20-40	15-40	5-20	0-5	---	NP
205	0-3	Fine sandy loam	ML	A-4	100	100	95-100	65-75	25-30	NP-5
Cryofluvents	3-50	Stratified silt to fine sand.	ML, CL	A-4, A-6, A-7	100	90-100	80-100	60-100	30-50	NP-25
	50-60	Extremely gravelly sand, very gravelly coarse sand.	GW, GP	A-1	20-40	15-40	5-20	0-5	---	NP
206	0-2	Silt loam	ML	A-4	100	100	95-100	65-75	25-30	NP-5
Cryofluvents	2-25	Stratified silt loam to fine sand.	ML, SM	A-4, A-2	100	100	70-100	10-90	0-40	NP-10
	25-60	Extremely gravelly sand, very gravelly sand, sand.	GP, SP, GW, SW	A-1	20-100	20-100	5-50	0-5	---	NP
207	0-6	Silt loam	ML, SM	A-4	75-95	75-95	60-75	40-60	25-35	NP-10
Donnelly	6-12	Cobbly silt loam, gravelly sandy loam.	SM, GM	A-4	65-75	65-75	40-60	35-50	25-35	NP-10
	12-60	Extremely gravelly sand, very cobbly sand.	GW, GP, GP-GM	A-1	30-50	20-40	15-25	0-5	---	NP
208	0-2	Silt loam	ML, MH	A-4, A-5	100	100	90-100	70-90	30-60	NP-10
Gerstle	2-60	Stratified silt loam to loamy fine sand.	ML	A-4	100	100	80-100	65-75	15-30	NP-5
209*:										
Typic Histoturbels	12-6	Peat	PT	A-8	---	---	---	---	---	---
	6-0	Mucky silt loam	ML, OL	A-4, A-5	100	100	90-100	70-90	30-50	NP-5
	0-6	Silt loam	ML	A-4	100	100	90-100	70-90	30-40	NP-5
	6-60	Ice or frozen soil.	---	---	---	---	---	---	---	---
Histosols	0-17	Peat	PT	A-8	---	---	---	---	---	---
	17-60	Ice or frozen soil.	---	---	---	---	---	---	---	---
210*:										
Histosols	0-20	Peat	PT	A-8	---	---	---	---	---	---
	20-60	Variable	---	---	---	---	---	---	---	---

See footnote at end of table.

Table 14—Engineering Index Properties—Continued

Soil name and map symbol	Depth	USDA texture	Classification		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	4	10	40	200		
	In								Pct	
210*:										
Liscum	13-8	Peat	PT	A-8	---	---	---	---	---	---
	8-0	Muck	PT	A-8	---	---	---	---	---	---
	0-60	Silt loam	ML, CL, CL-ML	A-4	100	100	80-100	50-80	0-30	NP-10
211	10-0	Peat	PT	A-8	---	---	---	---	---	---
Iksgiza	0-10	Silt loam, mucky silt loam.	ML, OL, MH, OH	A-5	100	100	90-100	70-90	40-60	NP-10
	10-20	Ice or frozen soil.	---	---	---	---	---	---	---	---
212	0-6	Silt loam	ML	A-4	100	100	95-100	65-75	25-30	NP-5
Jarvis	6-15	Stratified very fine sand to silt.	ML, SM	A-4	95-100	90-95	70-90	45-65	20-25	NP-5
	15-60	Very gravelly sand, extremely cobbly sand.	GP-GM, SP-SM	A-1	50-70	30-55	20-30	5-10	---	NP
213	0-9	Silt loam	ML	A-4	100	100	95-100	65-75	25-30	NP-5
Jarvis	9-36	Stratified very fine sand to silt.	ML, SM	A-4	95-100	90-95	70-90	45-65	20-25	NP-5
	36-60	Very gravelly sand, extremely cobbly sand.	GP-GM, SP-SM	A-1	50-70	30-55	20-30	5-10	---	NP
214*:										
Jarvis	0-5	Silt loam	ML	A-4	100	100	95-100	65-75	25-30	NP-5
	5-20	Stratified very fine sand to silt.	ML, SM	A-4	95-100	90-95	70-90	45-65	20-25	NP-5
	20-60	Very gravelly sand, extremely cobbly sand.	GP-GM, SP-SM	A-1	50-70	30-55	20-30	5-10	---	NP
Chena	0-2	Loam	ML	A-4	90-100	90-100	85-95	60-70	25-35	NP-10
	2-60	Very gravelly sand, very cobbly sand, extremely gravelly sand.	GP, SP	A-1	20-55	15-50	5-35	0-5	---	NP
215	0-10	Silt loam	ML	A-4	100	100	90-100	80-90	25-35	NP-10
Koyukuk	10-60	Silt loam, silt, very fine sandy loam.	ML	A-4	95-100	95-100	85-100	75-95	25-35	NP-10
216*:										
Liscum	12-0	Peat	PT	A-8	---	---	---	---	---	---
	0-60	Stratified silt loam to fine sand.	ML, CL, CL-ML	A-4	100	100	80-100	50-80	0-30	NP-10
Mosquito	10-0	Peat	PT	A-8	---	---	---	---	---	---
	0-8	Silt loam	ML, OL	A-4	100	100	90-100	70-90	30-40	NP-10
	8-20	Ice or frozen soil.	---	---	---	---	---	---	---	---

See footnote at end of table.

Table 14—Engineering Index Properties—Continued

Soil name and map symbol	Depth	USDA texture	Classification		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	4	10	40	200		
	In								Pct	
217---------- Lupine	0-3	Silt loam--------	ML	A-4	100	100	90-100	70-90	15-35	NP-5
	3-11	Silt loam--------	ML	A-4	100	95-100	80-90	50-75	25-35	NP-10
	11-15	Fine sand--------	SP-SM,SM	A-2, A-3	100	95-100	70-90	5-20	---	NP
	15-60	Extremely gravelly sand.	GP, GW	A-1	20-40	15-40	5-20	0-5	---	NP
218*:										
Lupine----------	0-3	Silt loam--------	ML	A-4	100	100	90-100	70-90	15-35	NP-5
	3-11	Silt loam--------	ML	A-4	100	95-100	80-90	50-75	25-35	NP-10
	11-15	Fine sand--------	SP-SM,SM	A-2, A-3	100	95-100	70-90	5-20	---	NP
	15-60	Extremely gravelly sand.	GP, GW	A-1	20-40	15-40	5-20	0-5	---	NP
218*:										
Moosehead-------	0-1	Silt loam--------	ML, MH	A-4, A-5	100	100	90-100	70-90	30-60	NP-10
	1-30	Stratified silt loam to loamy fine sand.	ML	A-4	100	100	80-100	65-75	15-35	NP-5
	30-60	Extremely gravelly sand, very gravelly sand.	GP, GW	A-1	20-50	15-45	5-20	0-5	---	NP
219---------- Moosehead	0-1	Silt loam--------	ML, MH	A-4, A-5	100	100	90-100	70-90	30-60	NP-10
	1-30	Stratified silt loam to loamy fine sand.	ML	A-4	100	100	80-100	65-75	15-35	NP-5
	30-60	Extremely gravelly sand, very gravelly sand.	GP, GW	A-1	20-50	15-45	5-20	0-5	---	NP
220---------- Mosquito	14-0	Peat-------------	PT	A-8	---	---	---	---	---	---
	0-3	Silt loam--------	ML, OL	A-4	100	100	90-100	70-90	30-40	NP-10
	3-60	Ice or frozen soil.	---	---	---	---	---	---	---	---
221. Riverwash										
222---------- Salchaket	0-3	Silt loam--------	ML	A-4	100	100	90-100	65-75	25-30	NP-5
	3-7	Very fine sandy loam.	ML	A-4	100	100	90-100	65-75	25-30	NP-5
	7-60	Stratified silt to very fine sand.	ML, SM	A-4	95-100	95-100	85-95	40-65	25-30	NP-5
223---------- Tanacross	9-0	Peat-------------	PT	A-8	---	---	---	---	---	---
	0-6	Silt loam--------	ML	A-4	100	100	80-100	70-90	30-40	NP-10
	6-11	Silt loam--------	ML	A-4	100	100	80-100	70-90	30-40	NP-10
	11-40	Ice or frozen soil.	---	---	---	---	---	---	---	---
224---------- Tanacross	8-0	Peat-------------	PT	A-8	---	---	---	---	---	---
	0-4	Silt loam--------	ML	A-4	100	100	80-100	70-90	30-40	NP-10
	4-16	Silt loam--------	ML	A-4	100	100	80-100	70-90	30-40	NP-10
	16-60	Ice or frozen soil.	---	---	---	---	---	---	---	---

See footnote at end of table.

Table 14—Engineering Index Properties—Continued

Soil name and map symbol	Depth	USDA texture	Classification		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	4	10	40	200		
	In								Pct	
225, 226--------- Tetlin	0-16 16-60	Silt loam-------- Ice or frozen soil.	ML ---	A-4, A-5 ---	100 ---	100 ---	90-100 ---	70-90 ---	30-50 ---	NP-5 ---
227-------------- Typic Eutrocryepts	0-28 28-32	Silt loam-------- Weathered bedrock	ML ---	A-4 ---	100 ---	100 ---	90-100 ---	70-90 ---	30-40 ---	NP-5 ---
228-------------- Typic Eutrocryepts	0-18 18-50 50-60	Silt loam-------- Fine sand-------- Weathered bedrock	ML SP-SM,SM ---	A-4 A-2, A-3 ---	100 85-100 ---	100 85-100 ---	90-100 70-90 ---	70-90 5-25 ---	30-40 --- ---	NP-5 NP ---
229-------------- Typic Eutrocryepts	0-4 4-34 34-56 56-60	Silt loam-------- Silt loam-------- Fine sand-------- Extremely cobbly sandy loam, extremely cobbly loamy sand, very cobbly sandy loam.	ML SP-SM,SM SP-SM,SM GM, SM	A-4 A-2, A-3 A-2, A-3 A-1	100 85-100 85-100 40-90	100 85-100 85-100 30-80	90-100 70-90 70-90 20-40	70-90 5-25 5-25 5-20	30-40 --- --- ---	NP-5 NP NP NP
230*: Typic Eutrocryepts---	0-25 25-38 38-60	Silt loam-------- Silt loam-------- Extremely cobbly sandy loam, extremely cobbly loamy sand, very cobbly sandy loam.	ML ML GM, SM	A-4 A-4 A-1	100 100 40-90	100 100 30-80	90-100 90-100 20-40	70-90 70-90 5-20	30-40 30-40 ---	NP-5 NP-5 NP
Typic Histoturbels---	8-0 0-7 7-12 12-60	Peat------------- Mucky silt loam Silt loam-------- Ice or frozen soil.	PT ML, OL ML ---	A-8 A-4, A-5 A-4 ---	--- 100 100 ---	--- 100 100 ---	--- 90-100 90-100 ---	--- 70-90 70-90 ---	--- 30-50 30-40 ---	--- NP-5 NP-5 ---
231*: Typic Eutrocryepts---	0-4 4-60	Silt loam-------- Silt loam-------- 	ML ML	A-4 A-4	100 100	100 100	90-100 90-100	70-90 70-90	30-40 30-40	NP-5 NP-5
Typic Aquorthels-----	0-9 9-33 33-60	Peaty silt loam Silt loam-------- Ice or frozen soil.	ML, OL, MH, OH ML ---	A-4, A-5 A-4, A-5 ---	100 100 ---	100 100 ---	90-100 90-100 ---	70-90 70-90 ---	30-100 30-50 ---	NP-10 NP-5 ---
232-------------- Volkmar	0-2 2-26 26-60	Silt loam-------- Silt loam-------- Very gravelly coarse sand, extremely gravelly sand.	ML ML GP, GW	A-4 A-4 A-1	100 100 30-50	100 100 30-50	90-95 90-95 5-20	75-90 75-90 0-5	30-40 30-40 ---	NP-10 NP-10 NP

Table 14—Engineering Index Properties—Continued

Soil name and map symbol	Depth	USDA texture	Classification		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	4	10	40	200		
	In								Pct	
W---------- Water										

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 15.--Physical and Chemical Properties of the Soils

(The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated.)

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility group
								K	T	
	In	Pct	g/cc	In/hr	In/in	pH				
201*:										
Aquic Eutrocryepts	0-2	5-10	0.80-1.20	0.6-2.0	0.20-0.22	5.6-6.0	Low	0.37	1	2
	2-18	5-10	1.20-1.50	0.6-2.0	0.15-0.22	5.6-7.3	Low	0.43		
	18-60	0-5	1.60-1.70	6.0-20	0.02-0.05	6.1-7.3	Low	0.05		
Tanacross	8-0	0-3	0.05-0.18	2.0-6.0	0.25-0.30	3.5-5.5	Low	0.02	2	8
	0-6	0-10	0.80-1.20	0.6-2.0	0.20-0.22	5.1-6.0	Low	0.37		
	6-22	0-10	1.20-1.40	0.6-2.0	0.20-0.22	5.6-6.5	Low	0.43		
	22-40	---	---	---	---	---	---	---		
202*:										
Aquic Eutrocryepts	0-7	5-10	0.80-1.20	0.6-2.0	0.20-0.22	5.1-6.0	Low	0.37	4	2
	7-33	5-10	1.20-1.50	0.6-2.0	0.15-0.22	5.6-6.5	Low	0.43		
	33-60	0-5	1.60-1.70	6.0-20	0.02-0.05	6.1-6.5	Low	0.05		
Typic Cryaquepts	0-5	5-30	1.20-1.60	0.6-2.0	0.26-0.30	6.6-7.3	Low	0.37	5	8
	5-61	5-30	1.20-1.60	0.6-2.0	0.26-0.30	6.6-7.3	Low	0.43		
	61-65	0-5	1.60-1.70	6.0-20	0.03-0.05	6.6-7.3	Low	0.05		
203*:										
Aquic Cryofluvents	0-2	5-10	1.10-1.30	0.6-2.0	0.20-0.22	6.6-7.3	Low	0.37	5	2
	2-60	0-10	1.20-1.60	0.2-0.6	0.15-0.22	6.6-7.8	Low	0.37		
Typic Cryaquents	0-1	20-30	1.10-1.10	0.2-0.6	0.20-0.22	6.1-7.3	Low	0.37	5	8
	1-60	0-10	1.20-1.60	0.6-6.0	0.06-0.22	6.6-7.3	Low	0.37		
204*:										
Beales	0-2	0-10	1.10-1.20	0.6-2.0	0.20-0.23	4.5-5.5	Low	0.37	1	2
	2-60	0-5	1.10-1.20	6.0-20	0.05-0.07	4.5-6.5	Low	0.24		
Lupine	0-4	5-10	1.10-1.20	0.6-2.0	0.20-0.22	5.1-6.0	Low	0.37	1	2
	4-12	0-10	1.20-1.40	0.6-2.0	0.17-0.20	5.6-6.5	Low	0.43		
	12-60	0-5	1.60-1.70	6.0-20	0.02-0.03	6.1-7.3	Low	0.02		
205	0-3	5-10	1.10-1.30	0.6-2.0	0.20-0.22	6.1-7.3	Low	0.37	3	2
Cryofluvents	3-50	5-40	0.90-1.60	0.6-6.0	0.10-0.30	6.6-7.8	Low	0.37		
	50-60	0-5	1.40-1.70	6.0-20	0.02-0.05	6.6-7.8	Low	0.05		
206	0-2	5-10	1.10-1.30	0.6-2.0	0.20-0.22	6.1-7.3	Low	0.37	2	2
Cryofluvents	2-25	0-10	1.20-1.60	0.6-6.0	0.06-0.22	6.1-7.3	Low	0.37		
	25-60	0-5	1.60-1.70	6.0-20	0.03-0.05	6.6-7.3	Low	0.05		
207	0-6	0-5	1.20-1.30	0.6-2.0	0.21-0.23	5.1-6.0	Low	0.37	1	2
Donnelly	6-12	0-5	1.20-1.30	2.0-6.0	0.12-0.18	5.6-6.0	Low	0.32		
	12-60	0-5	1.40-1.50	6.0-20	0.02-0.04	6.1-7.3	Low	0.10		
208	0-2	5-10	1.00-1.20	0.6-2.0	0.20-0.22	5.1-6.0	Low	0.37	5	2
Gerstle	2-60	5-10	1.20-1.40	0.6-2.0	0.15-0.22	5.1-6.0	Low	0.43		

See footnote at end of table.

Table 15.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility group
								K	T	
	In	Pct	g/cc	In/hr	In/in	pH				
209*:										
Typic Histoturbels	12-6	---	0.05-0.18	2.0-6.0	0.25-0.30	3.5-5.5	Low	0.02	2	8
	6-0	0-5	0.60-1.10	0.6-2.0	0.25-0.30	3.5-5.5	Low	0.02		
	0-6	0-10	1.00-1.30	0.6-2.0	0.24-0.28	5.6-6.5	Low	0.37		
	6-60	---	---	---	---	---	---	---		
Histosols	0-17	---	0.05-0.18	2.0-6.0	0.25-0.30	5.1-6.5	Low	0.05	1	8
	17-60	---	---	---	---	---	---	---		
210*:										
Histosols	0-20	---	0.05-0.18	2.0-6.0	0.25-0.30	5.1-6.5	Low	0.05	5	8
	20-60	---	---	---	---	---	---	---		
Liscum	13-8	---	0.05-0.18	0.6-2.0	0.25-0.30	6.1-7.3	Low	0.05	5	8
	8-0	---	0.05-0.18	0.6-2.0	0.25-0.30	6.1-7.3	Low	0.05		
	0-60	0-10	1.20-1.60	0.6-2.0	0.15-0.22	6.1-7.3	Low	0.43		
211	10-0	---	0.05-0.18	2.0-6.0	0.25-0.30	4.5-5.5	Low	0.05	1	8
Iksgiza	0-10	0-10	0.80-1.20	0.6-2.0	0.24-0.28	5.6-7.3	Low	0.37		
	10-20	---	---	---	---	---	---	---		
212	0-6	5-10	1.10-1.20	0.6-2.0	0.19-0.22	5.1-6.5	Low	0.37	2	2
Jarvis	6-15	0-10	1.10-1.20	0.6-2.0	0.15-0.18	5.6-7.3	Low	0.32		
	15-60	0-5	1.60-1.70	6.0-20	0.03-0.06	5.6-7.3	Low	0.05		
213	0-9	5-10	1.10-1.20	0.6-2.0	0.19-0.22	5.1-6.5	Low	0.37	2	2
Jarvis	9-36	0-10	1.10-1.20	0.6-2.0	0.15-0.18	5.6-7.3	Low	0.32		
	36-60	0-5	1.60-1.70	6.0-20	0.03-0.06	5.6-7.3	Low	0.05		
214*:										
Jarvis	0-5	5-10	1.10-1.20	0.6-2.0	0.19-0.22	5.1-6.5	Low	0.37	2	2
	5-20	0-10	1.10-1.20	0.6-2.0	0.15-0.18	5.6-7.3	Low	0.32		
	20-60	0-5	1.60-1.70	6.0-20	0.03-0.06	5.6-7.3	Low	0.05		
Chena	0-2	0-5	1.10-1.20	0.6-2.0	0.20-0.23	5.6-6.5	Low	0.37	5	2
	2-60	0-5	1.40-1.50	6.0-20	0.03-0.05	5.6-6.5	Low	0.10		
215	0-10	5-10	1.10-1.20	0.6-2.0	0.20-0.22	5.1-6.5	Low	0.37	5	2
Koyukuk	10-60	5-10	1.10-1.20	0.6-2.0	0.20-0.22	5.6-7.3	Low	0.43		
216*:										
Liscum	12-0	---	0.05-0.18	0.6-2.0	0.25-0.30	5.6-6.5	Low	0.05	3	8
	0-60	0-10	1.20-1.60	0.6-2.0	0.15-0.22	6.1-7.3	Low	0.43		
Mosquito	10-0	---	0.05-0.18	2.0-6.0	0.25-0.30	5.6-6.5	Low	0.05	1	8
	0-8	0-10	0.80-1.40	0.6-2.0	0.24-0.28	5.6-6.5	Low	0.37		
	8-20	0-10	---	---	---	---	---	---		
217	0-3	5-10	1.10-1.20	0.6-2.0	0.20-0.22	5.1-6.0	Low	0.37	1	2
Lupine	3-11	0-10	1.20-1.40	0.6-2.0	0.17-0.20	5.6-6.5	Low	0.43		
	11-15	0-5	1.20-1.40	2.0-6.0	0.05-0.07	5.6-6.5	Low	0.10		
	15-60	0-5	1.60-1.70	6.0-20	0.02-0.03	6.1-7.3	Low	0.02		
218*:										
Lupine	0-3	5-10	1.10-1.20	0.6-2.0	0.20-0.22	5.1-6.0	Low	0.37	1	2
	3-11	0-10	1.20-1.40	0.6-2.0	0.17-0.20	5.6-6.5	Low	0.43		
	11-15	0-5	1.20-1.40	2.0-6.0	0.05-0.07	5.6-6.5	Low	0.10		
	15-60	0-5	1.60-1.70	6.0-20	0.02-0.03	6.1-7.3	Low	0.02		

See footnote at end of table.

Table 15.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility group
								K	T	
	In	Pct	g/cc	In/hr	In/in	pH				
218*:										
Moosehead	0-1	5-10	1.00-1.20	0.6-2.0	0.20-0.22	5.1-6.0	Low	0.37	2	2
	1-30	5-10	1.20-1.40	0.6-2.0	0.15-0.22	5.6-7.3	Low	0.43		
	30-60	0-5	1.60-1.70	6.0-20	0.02-0.05	6.1-7.3	Low	0.05		
219	0-1	5-10	1.00-1.20	0.6-2.0	0.20-0.22	5.1-6.0	Low	0.37	2	2
Moosehead	1-30	5-10	1.20-1.40	0.6-2.0	0.15-0.22	5.6-7.3	Low	0.43		
	30-60	0-5	1.60-1.70	6.0-20	0.02-0.05	6.1-7.3	Low	0.05		
220	14-0	---	0.05-0.18	2.0-6.0	0.25-0.30	5.6-6.5	Low	0.05	1	8
Mosquito	0-3	0-10	0.80-1.40	0.6-2.0	0.24-0.28	5.6-6.5	Low	0.37		
	3-60	0-10	---	---	---	---	---	---		
221.										
Riverwash										
222	0-3	5-10	1.10-1.20	0.6-2.0	0.20-0.22	5.1-6.0	Low	0.37	5	2
Salchaket	3-7	5-10	1.10-1.20	0.6-2.0	0.20-0.22	5.6-7.3	Low	0.43		
	7-60	5-10	1.20-1.30	0.6-2.0	0.15-0.18	6.1-7.3	Low	0.32		
223	9-0	0-3	0.05-0.18	2.0-6.0	0.25-0.30	3.5-5.0	Low	0.02	1	8
Tanacross	0-6	0-10	0.80-1.20	0.6-2.0	0.20-0.22	5.1-6.0	Low	0.37		
	6-11	0-10	1.20-1.40	0.6-2.0	0.20-0.22	5.1-6.0	Low	0.43		
	11-40	---	---	---	---	---	---	---		
224	8-0	0-3	0.05-0.18	2.0-6.0	0.25-0.30	3.5-5.0	Low	0.02	1	8
Tanacross	0-4	0-10	0.80-1.20	0.6-2.0	0.20-0.22	5.1-6.0	Low	0.37		
	4-16	0-10	1.20-1.40	0.6-2.0	0.20-0.22	5.1-6.0	Low	0.43		
	16-60	---	---	---	---	---	---	---		
225, 226	0-16	0-10	0.80-1.30	0.6-2.0	0.24-0.28	5.6-7.8	Low	0.37	2	8
Tetlin	16-60	---	---	---	---	---	---	---		
227	0-28	0-10	0.90-1.30	0.6-2.0	0.30-0.34	6.1-7.3	Low	0.43	2	2
Typic Eutrocryepts	28-60	---	---	---	---	---	Low	---		
228	0-18	0-10	0.90-1.30	0.6-2.0	0.30-0.34	6.1-7.3	Low	0.43	3	2
Typic Eutrocryepts	18-50	0-5	1.50-1.90	2.0-6.0	0.05-0.10	6.1-7.3	Low	0.24		
	50-60	---	---	---	---	---	Low	---		
229	0-4	0-10	0.90-1.30	0.6-2.0	0.30-0.34	6.1-7.3	Low	0.37	2	2
Typic Eutrocryepts	4-34	0-5	1.50-1.90	2.0-6.0	0.05-0.10	6.1-7.3	Low	0.24		
	34-56	0-5	1.50-1.90	2.0-6.0	0.05-0.10	6.1-7.3	Low	0.24		
	56-60	0-5	1.50-1.90	6.0-20	0.03-0.08	6.1-7.3	Low	0.05		
230*:										
Typic Eutrocryepts	0-25	0-10	0.90-1.30	0.6-2.0	0.30-0.34	6.1-7.3	Low	0.37	2	2
	25-38	0-10	0.90-1.30	0.6-2.0	0.30-0.34	6.1-7.3	Low	0.43		
	38-60	0-5	1.50-1.90	6.0-20	0.03-0.08	6.1-7.3	Low	0.05		
Typic Histoturbels	8-0	---	0.05-0.18	2.0-6.0	0.25-0.30	3.5-5.5	Low	0.02	2	8
	0-7	0-5	0.60-1.10	0.6-2.0	0.25-0.30	3.5-5.5	Low	0.02		
	7-12	0-10	1.00-1.30	0.6-2.0	0.24-0.28	5.6-6.5	Low	0.37		
	12-60	---	---	---	---	---	---	---		

See footnote at end of table.

Table 15.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility group
								K	T	
	In	Pct	g/cc	In/hr	In/in	pH				
231*:										
Typic Eutrocryepts	0-4	0-10	0.90-1.30	0.6-2.0	0.30-0.34	6.1-7.3	Low	0.37	2	2
	4-60	0-10	0.90-1.30	0.6-2.0	0.30-0.34	6.1-7.3	Low	0.43		
Typic Aquorthels	0-9	0-10	0.70-0.90	0.6-2.0	0.25-0.30	5.6-6.5	Low	0.37	2	2
	9-33	0-10	0.80-1.30	0.6-2.0	0.24-0.28	6.1-7.3	Low	0.43		
	33-60	---	---	---	---	---	---	--		
232 Volkmar	0-2	5-10	1.10-1.20	0.6-2.0	0.20-0.23	4.5-5.5	Low	0.37	3	2
	2-26	5-10	1.10-1.20	0.6-2.0	0.20-0.23	5.1-6.5	Low	0.43		
	26-60	0-5	1.60-1.70	6.0-20	0.05-0.07	5.1-6.5	Low	0.05		
W Water										

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 16.--Water Features

("Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated.)

Soil name and map symbol	Hydrologic group	Flooding			High water table		
		Frequency	Duration	Months	Depth	Kind	Months
					Ft		
201*:							
Aquic Eutrocryepts	B	Rare	---	---	1.5-3.0	Perched	Apr-Jun
Tanacross	D	Rare	---	---	0-1.0	Perched	Jan-Dec
202*:							
Aquic Eutrocryepts	C	Rare	---	---	2.0-6.0	Apparent	Jan-Dec
Typic Cryaquepts	D	Rare	---	---	0-3.0	Apparent	Jan-Dec
203*:							
Aquic Cryofluvents	C	Rare	---	---	2.0-4.0	Apparent	Jan-Dec
Typic Cryaquents	D	Occasional	Brief	Apr-Sep	0-2.0	Apparent	Jan-Dec
204*:							
Beales	B	None	---	---	>6.0	---	---
Lupine	B	Rare	---	---	>6.0	---	---
205--Cryofluvents	C	Occasional	Brief	Apr-Sep	1.0-6.0	Apparent	Jan-Dec
206--Cryofluvents	B	Rare	---	---	>6.0	---	---
207--Donnelly	A	None	---	---	>6.0	---	---
208--Gerstle	B	Rare	---	---	1.5-3.0	Perched	Apr-Jun
209*:							
Typic Histoturbels	D	None	---	---	0-1.0	Perched	Jan-Dec
Histosols	D	None	---	---	+1-1.0	Apparent	Jan-Dec
210*:							
Histosols	D	Rare	---	---	+1-1.0	Apparent	Jan-Dec
Liscum	D	Rare	---	---	0-1.0	Apparent	Jan-Dec
211--Iksgiza	D	None	---	---	0-1.5	Perched	Jan-Dec
212, 213--Jarvis	B	Rare	---	---	>6.0	---	---
214*:							
Jarvis	B	Rare	---	---	>6.0	---	---
Chena	A	Rare	---	---	>6.0	---	---

See footnote at end of table.

Table 16.--Water Features--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table		
		Frequency	Duration	Months	Depth	Kind	Months
					Ft		
215---------- Koyukuk	B	None----------	---	---	>6.0	---	---
216*:							
Liscum----------	D	Rare----------	---	---	0-1.0	Apparent---	Jan-Dec
Mosquito----------	D	Rare----------	---	---	+1-1.0	Perched----	Jan-Dec
217---------- Lupine	B	Rare----------	---	---	>6.0	---	---
218*:							
Lupine----------	B	Rare----------	---	---	>6.0	---	---
Moosehead----------	B	Rare----------	---	---	1.5-3.0	Perched----	Apr-Jun
219---------- Moosehead	B	Rare----------	---	---	1.5-3.0	Perched----	Apr-Jun
220---------- Mosquito	D	Rare----------	---	---	+1-1.0	Perched----	Jan-Dec
221. Riverwash							
222---------- Salchaket	B	Rare----------	---	---	>6.0	---	---
223---------- Tanacross	D	Rare----------	---	---	0-1.0	Perched----	Jan-Dec
224---------- Tanacross	D	None----------	---	---	0-1.0	Perched----	Jan-Dec
225, 226---------- Tetlin	D	None----------	---	---	0-3.0	Perched----	Jan-Dec
227, 228, 229--------- Typic Eutrocryepts	B	None----------	---	---	>6.0	---	---
230*:							
Typic Eutrocryepts---	B	None----------	---	---	>6.0	---	---
Typic Histoturbels---	D	None----------	---	---	0-1.0	Perched----	Jan-Dec
231*:							
Typic Eutrocryepts---	B	None----------	---	---	>6.0	---	---
Typic Aquorthels-----	D	None----------	---	---	0-3.0	Perched----	Jan-Dec
232---------- Volkmar	B	None----------	---	---	1.5-3.0	Perched----	Apr-Jun
W. Water							

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 17.--Soil Features

(The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated.)

Soil name and map symbol	Bedrock	Subsidence			Risk of corrosion		
	Depth	Hardness	Initial	Total	Potential frost action	Uncoated steel	Concrete
	In		In	In			
201*:							
Aquic Eutrocryepts	>60	---	---	---	High	Moderate	Moderate
Tanacross	>60	---	1-8	8-16	High	High	High
202*:							
Aquic Eutrocryepts	>60	---	---	---	High	Moderate	Moderate
Typic Cryaquepts	>60	---	---	---	High	Low	Moderate
203*:							
Aquic Cryofluvents	>60	---	---	---	Low	Low	Moderate
Typic Cryaquents	>60	---	---	---	High	Low	Moderate
204*:							
Beales	>60	---	---	---	Moderate	High	High
Lupine	>60	---	---	---	Low	Moderate	Moderate
205--Cryofluvents	>60	---	---	---	High	Low	Moderate
206--Cryofluvents	>60	---	---	---	High	Low	Moderate
207--Donnelly	>60	---	---	---	Moderate	Moderate	Moderate
208--Gerstle	>60	---	---	---	Moderate	Moderate	Moderate
209*:							
Typic Histoturbels	>60	---	4-8	8-16	High	High	High
Histosols	>60	---	8-10	16-20	High	Moderate	Moderate
210*:							
Histosols	>60	---	8-10	16-20	High	Moderate	Moderate
Liscum	>60	---	1-6	6-12	High	Moderate	Moderate
211--Iksgiza	>60	---	1-5	5-10	High	High	High
212, 213--Jarvis	>60	---	---	---	Moderate	Moderate	Moderate
214*:							
Jarvis	>60	---	---	---	Moderate	Moderate	Moderate
Chena	>60	---	---	---	Low	Moderate	Moderate

See footnote at end of table.

Table 17.--Soil Features--Continued

Soil name and map symbol	Bedrock	Subsidence			Risk of corrosion		
	Depth	Hardness	Initial	Total	Potential frost action	Uncoated steel	Concrete
	In		In	In			
215--Koyukuk	>60	---	---	---	High	Moderate	Moderate
216*:							
Liscum	>60	---	1-6	6-12	High	Moderate	Moderate
Mosquito	>60	---	1-6	10-12	High	Moderate	Moderate
217--Lupine	>60	---	---	---	Low	Moderate	Moderate
218*:							
Lupine	>60	---	---	---	Low	Moderate	Moderate
Moosehead	>60	---	---	---	Moderate	Moderate	Moderate
219--Moosehead	>60	---	---	---	Moderate	Moderate	Moderate
220--Mosquito	>60	---	1-6	10-12	High	Moderate	Moderate
221. Riverwash							
222--Salchaket	>60	---	---	---	Moderate	Moderate	Moderate
223--Tanacross	>60	---	1-8	8-16	High	High	High
224--Tanacross	>60	---	1-8	8-16	High	High	High
225, 226--Tetlin	>60	---	---	---	High	High	High
227--Typic Eutrocryepts	10-45	Hard	---	---	Moderate	Low	Moderate
228--Typic Eutrocryepts	30-60	Hard	---	---	Moderate	Low	Moderate
229--Typic Eutrocryepts	>60	---	---	---	Moderate	Low	Moderate
230*:							
Typic Eutrocryepts	>60	---	---	---	Moderate	Low	Moderate
Typic Histoturbels	>60	---	4-8	8-16	High	High	High
231*:							
Typic Eutrocryepts	>60	---	---	---	Moderate	Low	Moderate
Typic Aquorthels	>60	---	0-0	---	High	Moderate	Moderate
232--Volkmar	>60	---	---	---	High	High	High
W. Water							

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 18.--Physical Test Data for Selected Soils

(Dashes indicate that material was not detected. A blank indicates that a determination was not made. LL means liquid limit, PI means plasticity index, TR means trace, and NP means nonplastic.)

Soil name (map unit symbol), location, and sample number	Horizon	Depth	Particle-size distribution: Clay (<0.002 mm)	Silt (0.05-0.002 mm)	Sand (2.0-0.05 mm)	Percentage of whole soil >2 mm by weight	Atterberg limits: LL	PI	Bulk density: 1/3 bar	Oven-dry	COLE	Water content: 1/3 bar	15 bar
		In	Pct	Pct	Pct		Pct <0.4mm		g/cc	g/cc	cm/cm	Pct (wt)	
Typic Cryaquepts (202)--	Oe	0-2							0.31	0.55	0.211	208.9	40.6
lat. 64° 01′08" N.	Oa	2-4							0.92	1.11	0.065	57.8	27.1
long. 145° 11′26" W.	Bg1	4-9	16.7	73.7	9.6	---	41	15	1.27	1.29	0.005	33.3	8.6
(S91AK-240-001)	Bg2	9-13	16.0	72.4	11.6	---	42	14	1.31	1.31	0.065	37.0	8.6
	Bw1	13-22	15.4	73.4	11.2	---	35	8	1.67	1.70	0.006	23.3	7.9
	Bw2	22-30	16.4	72.8	10.8	---	35	8	1.57	1.60	0.006	26.5	7.8
	Bw3	30-40	17.4	74.2	8.4	---	34	13	1.41	1.56	0.034	27.2	7.7
	B′g1	40-48	16.9	74.0	9.1	---	36	12					8.5
	B′g2	48-60	27.9	68.3	3.8	---	42	16	1.51	1.54	0.007	30.2	12.0
	Bg3	60-66	42.3	56.5	1.2	---	48	18	1.29	1.35	0.015	41.8	14.0
	2C	66-70	9.4	19.8	70.8	29		NP					4.4
Lupine (217)----------	Oi	0-3				---			0.35	0.35	---	50.8	27.9
lat. 64° 01′05" N.	AE	3-5	8.5	66.8	24.7	1			0.69	0.73	0.019	43.6	11.7
long. 145° 08′24" W.	Bw1	5-7	8.4	62.4	29.2	TR		NP	1.08	1.08	---	30.4	7.0
(S91AK-240-004)	Bw2	7-14	7.7	53.7	38.6	2		NP	1.22	1.22	---	18.7	5.1
	BC	14-18	1.6	17.3	81.1	8							2.1
	2C	18-40	2.4	2.0	95.6	78							1.4
Moosehead (219)---------	Oi	0-3				---			0.11	0.12	0.029	239.7	57.0
lat. 64° 01′10" N.	Oa	3-5				---			0.47	0.57	0.066	52.0	10.7
long. 145° 07′27" W.	A	5-8	4.1	65.1	30.8	1	54	6	0.72	0.72	---	38.7	12.8
(S91AK-240-003)	Bw/A	8-17	2.6	49.8	47.6	---	NP	1.24	1.25	0.003	25.5	5.5	
	Bw	17-35	3.2	45.3	51.5	---	24	3					4.6
	C1	35-38	0.7	40.6	58.7	4		NP					3.1
	2C2	38-56	0.6	5.7	93.7	76		NP					1.3
Salchaket (222)---------	Oe/C	0-4							0.49	0.52	0.020	73.7	13.6
lat. 63° 50′36" N.	C	4-11	5.5	50.4	44.1	---		NP	1.24	1.24	---	32.8	2.3
long. 144° 53′15" W.	Oa/Cb	11-13				---			0.63	0.79	0.078	55.4	12.6
(S91AK-240-005)	C/Oab	13-20	9.1	61.4	29.5	---		NP	1.05	1.05	---	30.3	3.4
	C′1	20-31	2.3	26.0	71.7	---		NP					1.0
	C′2	31-40	8.4	58.1	33.5	---	31	3	1.19	1.19	---	22.2	3.5
	C′3	40-46	2.6	5.6	91.8	---							0.7
	C′4	46-52	1.6	28.8	69.6	---	27	1	1.30	1.30	---	28.6	1.4
	C′5	52-58	2.7	8.4	88.9	---							0.8
	C′6	58-74	5.6	61.2	33.2	---	34	2					1.9
	2C	74-78				---							
Tetlin (226)----------	Oe	0-7				---			0.41	0.48	0.054	50.6	6.3
lat. 63° 49′47" N.	A	7-9	2.7	71.1	26.2	---	47		0.87	0.95	0.030	41.1	7.6
long. 144° 53′45" W.	Bw	9-11	6.9	69.0	24.1	---	43		0.86	0.93	0.026	35.3	7.7
(S91AK-240-006)	Ab	11-14	6.2	59.4	34.4	---	43		0.68	1.02	0.145	82.4	8.2
	Bwb	14-24	6.7	64.0	29.3	---			1.09	1.09	---	33.7	5.6
	Bg	24-31	6.8	50.3	42.9	---		NP	1.28	1.29	0.003	26.7	4.5
	Bgf	31-42	6.3	49.7	44.0	---		NP	1.39	1.40	0.002	30.2	4.1

Table 18.--Physical Test Data for Selected Soils

(Dashes indicate that material was not detected. A blank indicates that a determination was not made. LL means liquid limit, PI means plasticity index, TR means trace, and NP means nonplastic.)

Soil name (map unit symbol), location, and sample number	Horizon	Depth	Particle-size distribution			Percentage of whole soil >2 mm by weight	Atterberg limits		Bulk density		COLE	Water content	
			Clay (<0.002 mm)	Silt (0.05-0.002 mm)	Sand (2.0-0.05 mm)		LL	PI	1/3 bar	Oven-dry		1/3 bar	15 bar
		In	Pct	Pct	Pct		Pct <0.4mm		g/cc	g/cc	cm/cm	Pct (wt)	
Aquic Eutrocryepts (229 inclusion)--------	Oe	0-3				---			0.27	0.32	0.058	115.2	12.8
lat. 63° 46′08" N.	Bg1	3-16	7.1	58.8	34.1	---	36	2	1.07	1.09	0.006	38.8	5.8
long. 144° 43′14" W.	Bg2	16-20	4.4	70.7	24.9	---		NP	1.30	1.32	0.005	28.9	3.5
(S91AK-240-007)	2BC	20-29	3.3	7.0	89.7	13		NP					2.5
	3C	29-55	3.2	8.5	88.3	59							1.6

Table 19.--Chemical Test Data for Selected Soils

(A blank indicates that a determination was not made.)

Soil name (map unit symbol), location, and sample number	Horizon	Depth	Organic carbon	Cation-exchange capacity		Base saturation		pH (1:1 water)
				Ammonium acetate	Sum of cations	Ammonium acetate	Sum of cations	
		In	Pct	meq/100g	meq/100g	Pct	Pct	
Typic Cryaquepts (202)--	Oe	0-2	22.5	61.2	90.6	77	52	5.0
lat. 64° 01′08" N.	Oa	2-4	11.2	38.7	55.8	81	56	5.4
long. 145° 11′26" W.	Bg1	4-9	1.40	17.5	21.3	95	78	6.5
(S91AK-240-001)	Bg2	9-13	1.14	17.7	20.8	100	85	7.1
	Bw1	13-22	0.43	15.7	17.2	99	91	7.4
	Bw2	22-30	0.24	15.3	17.2	100	90	7.6
	Bw3	30-40	0.24	15.4	17.5	100	90	7.6
	B′g1	40-48	0.28	15.7	17.7	100	92	7.7
	B′g2	48-60	0.23	18.6	20.9	100	91	7.6
	Bg3	60-66	0.37	20.6	23.3	100	89	7.6
	2C	66-70	0.90	10.2	11.6	100	94	7.5
Lupine (217)----------	Oi	0-3	9.20	32.6	44.6	44	32	4.8
lat. 64° 01′05" N.	AE	3-5	5.68	26.4	34.3	46	35	5.2
long. 145° 08′24" W.	Bw1	5-7	2.08	14.2	20.0	36	26	5.3
(S91AK-240-004)	Bw2	7-14	0.63	8.8	11.8	43	32	5.4
	BC	14-18	0.23	3.9	7.0	51	29	5.6
	2C	18-40	0.11	2.1	3.6	76	44	5.8
Moosehead (219)---------	Oi	0-3	30.5	65.5	65.7	21	21	3.9
lat. 64° 01′10" N.	Oa	3-5	8.22	36.6	51.7	39	28	4.6
long. 145° 07′27" W.	A	5-8	6.42	33.3	32.2	53	55	5.0
(S91AK-240-003)	Bw/A	8-17	2.01	13.6	20.4	56	37	5.6
	Bw	17-35	0.36	7.6	10.7	83	59	6.1
	C1	35-38	0.43	6.0	10.1	70	42	6.1
	2C2	38-56	0.13	2.2	4.4	82	41	6.1
Salchaket (222)---------	Oe/C	0-4	7.74	26.7	42.5	100	64	5.4
lat. 63° 50′36" N.	C	4-11	0.52	3.3	8.5	100	82	7.1
long. 144° 53′15" W.	Oa/Cb	11-13	6.30	29.5	41.9	100	84	7.0
(S91AK-240-005)	C/Oab	13-20	0.88	5.9		100		7.7
	C′1	20-31	0.18	1.4		100		8.0
	C′2	31-40	0.40	3.9		100		8.0
	C′3	40-46	0.03	0.5		100		8.0
	C′4	46-52	0.08	0.8		100		8.0
	C′5	52-58	0.06	0.6		100	100	8.1
	C′6	58-74	0.14	1.7		100		8.0
	2C	74-78						
Tetlin (226)----------	Oe	0-7	4.50	19.0	46.4	63	26	4.9
lat. 63° 49′47" N.	A	7-9	3.80	23.8	34.4	96	67	5.9
long. 144° 53′45" W.	Bw	9-11	2.80	20.2	29.2	100	76	6.4
(S91AK-240-006)	Ab	11-14	3.70	25.0	36.6	100	77	6.6
	Bwb	14-24	1.65	14.5	21.6	100	84	7.1
	Bg	24-31	0.66	9.7	16.0	100	81	7.5
	Bgf	31-42	0.46	8.0	12.5	100	89	7.8
Aquic Eutrocryepts								
(229 inclusion)--------	Oe	0-3	6.37	23.7	35.0	87	59	6.1
lat. 63° 46′08" N.	Bg1	3-16	1.89	11.0	16.2	74	50	5.9
long. 144° 43′14" W.	Bg2	16-20	0.34	5.1	8.3	90	55	6.4
(S91AK-240-007)	2BC	20-29	0.18	4.2	6.9	86	52	6.6
	3C	29-55	0.14	3.2	4.7	97	66	6.7

Table 20.--Classification of the Soils

Soil name	Family or higher taxonomic class
Aquic Eutrocryepts	Aquic Eutrocryepts
Aquic Cryofluvents	Aquic Cryofluvents
Beales	Sandy, mixed Typic Dystrocryepts
Chena	Sandy-skeletal, mixed Typic Cryorthents
Cryofluvents	Cryofluvents
Donnelly	Sandy-skeletal, mixed Typic Eutrocryepts
Gerstle	Coarse-loamy, mixed, superactive Aquic Eutrocryepts
Typic Histoturbels	Typic Histoturbels
Histosols	Histosols
Iksgiza	Coarse-loamy over sandy or sandy-skeletal, mixed, superactive, subgelic Typic Histoturbels
Jarvis	Coarse-loamy over sandy or sandy-skeletal, mixed, superactive, nonacid Typic Cryofluvents
Koyukuk	Coarse-silty, mixed, superactive Typic Dystrocryepts
Liscum	Coarse-loamy, mixed, superactive, nonacid Histic Cryaquepts
Lupine	Coarse-loamy over sandy or sandy-skeletal, mixed, superactive Typic Eutrocryepts
Moosehead	Coarse-loamy over sandy or sandy-skeletal, mixed, superactive Aquic Eutrocryepts
Mosquito	Coarse-loamy, mixed, superactive, subgelic Ruptic Histoturbels
Typic Aquorthels	Typic Aquorthels
Salchaket	Coarse-loamy, mixed, superactive, nonacid Typic Cryofluvents
Tanacross	Coarse-loamy, mixed, superactive, subgelic Typic Histoturbels
Tetlin	Coarse-loamy, mixed, superactive, subgelic Typic Aquiturbels
Typic Cryaquents	Typic Cryaquents
Typic Cryaquepts	Typic Cryaquepts
Typic Eutrocryepts	Typic Eutrocryepts
Volkmar	Coarse-silty over sandy or sandy-skeletal, mixed, superactive Aquic Eutrocryepts

Appendix

Scientific Names of Plants

Common name	Scientific name
American twinflower	Linnaea borealis L.
Arctic sweet coltsfoot	Petasites frigidus (L.) Fries
Bebb willow	Salix bebbiana Sarg.
Labrador tea ledum	Ledum groenlandicum Oeder
Mackenzie's water hemlock	Cicuta mackenzieana Raup
Northwest Territory sedge	Carex rhynchophysa C.A. Mey.
Alder	Alnus Mill.
Altai fescue	Festuca altaica Trin.
Arctic lupine	Lupinus arcticus S. Wats.
Balsam poplar	Populus balsamifera L.
Beachhead iris	Iris setosa Pallas ex Link
Black crowberry	Empetrum nigrum L.
Black spruce	Picea mariana (P. Mill.) B.S.P.
Blueberry willow	Salix myrtillifolia Anderss.
Bog blueberry	Vaccinium uliginosum L.
Bunchberry dogwood	Cornus canadensis L.
Cloudberry	Rubus chamaemorus L.
Common fireweed	Epilobium angustifolium L.
Common yarrow	Achillea millefolium L.
Cottongrass	Eriophorum L.
Currant	Ribes L.
Diamondleaf willow	Salix planifolia Pursh
Dryas	Dryas L.
Dwarf fireweed	Epilobium latifolium L.
Dwarf scouringrush	Equisetum scirpoides Michx.
Feltleaf willow	Salix alaxensis (Anderss.) Coville
Field oxytrope	Oxytropis campestris (L.) DC.
Green alder	Alnus crispa (Ait.) Pursh
Highbush cranberry	Viburnum edule (Michx.) Raf.
Horsetail	Equisetum L.
Kinnikinnick	Arctostaphylos uva-ursi (L.) Spreng.
Leatherleaf	Chamaedaphne calyculata (L.) Moench
Lingonberry	Vaccinium vitis-idaea L.
Littletree willow	Salix arbusculoides Anderss.
Marsh horsetail	Equisetum fluviatile L.
Northern commandra	Geocaulon lividum (Richards.) Fern.
Paper birch	Betula papyrifera Marsh.
Polargrass	Arctagrostis latifolia (R. Br.) Griseb.
Prickly rose	Rosa acicularis Lindl.
Quaking aspen	Populus tremuloides Michx.
Red fruit bearberry	Arctostaphylos rubra (Rehd. & Wilson) Fern.
Reedgrass	Calamagrostis Adans.
Russet buffaloberry	Shepherdia canadensis (L.) Nutt.
Sedge	Carex L.
Shrub birch	Betula glandulosa Michx.
Shrubby cinquefoil	Potentilla fruticosa auct. non L.
Spruce	Picea A. Dietr.
Swamp cinquefoil	Potentilla palustris (L.) Scop.
Sweet gale	Myrica gale L.
Sweetvetch	Hedysarum L.
Tall bluebells	Mertensia paniculata (Ait.) G. Don
Tamarack	Larix laricina (Du Roi) K. Koch
Thinleaf alder	Alnus tenuifolia Nutt.
Water sedge	Carex aquatilis Wahlenb.
White spruce	Picea glauca (Moench) Voss
Willow	Salix L.
Wintergreen	Pyrola L.

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145°15′ 145°00′ 144°45′

64°07′30″

64°00′

63°52′30″

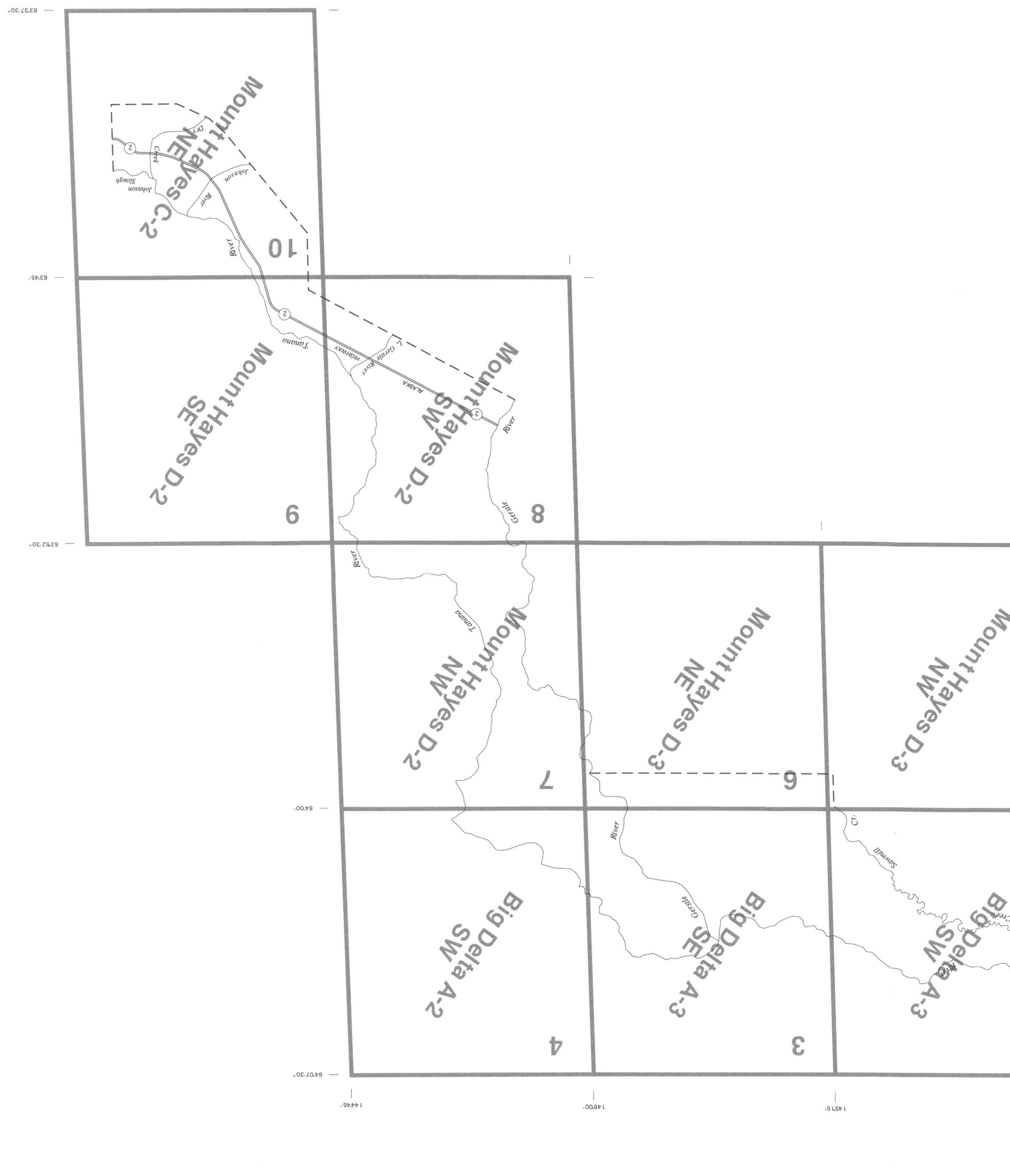
63°45′

63°37′30″

N

ssociation
Association
e Association
nnelly Association
quothels-Typic Histoturbels Association
ssociation
ibed in the text
ap Units."

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.


63°37'30"
63°45'
63°52'30"
64°00'
64°07'30"
144°45'
145°00'
145°15'
Mount Hayes C-2 NE
Mount Hayes D-2 SE
Mount Hayes D-2 SW
Mount Hayes D-2 NW
Mount Hayes D-3 NE
Mount Hayes D-3 NW
Big Delta A-2 SW
Big Delta A-3 SE
Big Delta A-3 SW
10
9
8
7
6
4
3
Johnson Slough
Johnson River
Tanana
Alaska Highway
Gerstle River
Gerstle
Tanana
Sawmill Cr.
2
N

SOIL LEGEND

SYMBOL	NAME
201	Aquic Eutrocryepts - Tanacross complex
202	Aquic Eutrocryepts - Typic Cryaquepts complex
203	Aquic Cryofluvents - Typic Cryaquents complex
204	Beales-Lupine complex, steep
205	Cryofluvents, occasionally flooded
206	Cryofluvents, rarely flooded
207	Donnelly silt loam
208	Gerstle silt loam
209	Typic Histoturbels - Histosols complex, gently sloping
210	Histosols - Liscum complex
211	Iksgiza peat, undulating
212	Jarvis silt loam, shallow
213	Jarvis silt loam, moderately deep
214	Jarvis - Chena complex
215	Koyukuk silt loam, rolling
216	Liscum and Mosquito peats
217	Lupine silt loam
218	Lupine and Moosehead silt loams
219	Moosehead silt loam
220	Mosquito peat
221	Riverwash
222	Salchaket silt loam
223	Tanacross peat
224	Tanacross peat, terraces
225	Tetlin silt loam, 3 to 15 percent slopes
226	Tetlin silt loam, 15 to 50 percent slopes
227	Typic Eutrocryepts, bedrock substratum, 30 to 60 percent slopes
228	Typic Eutrocryepts, sandy substratum, 20 to 45 percent slopes
229	Typic Eutrocryepts, steep
230	Typic Eutrocryepts - Typic Histoturbels complex, steep
231	Typic Eutrocryepts - Typic Aquorthels complex, steep
232	Volkmar silt loam
W	Water

BOUNDARIES

Limit of soil survey (label)

Field sheet matchline and neatline

STATE COORDINATE TICK
1 890 000 FEET

LAND DIVISION CORNER
(sections and land grants)

PITS

Gravel pit

Mine or quarry

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

GERSTLE RIVER AREA, ALASKA

BIG DELTA (A–4) SE QUADRANGLE
SHEET NUMBER 1
7.5 MINUTE SERIES

This soil survey map was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1979–1980 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned. Digital soils data is available for this quadrangle.

1 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 0 1 KILOMETER

Scale 1:24l000

Digital Data: UTM Coordinate System Zone: 6
Polyconic Projjection
1927 North Ameriican Datum

N

SHEET NUMBER 1 OF 10
GERSTLE RIVER AREA, ALASKA
BIG DELTA (A–4) SE QUADRANGLE

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

GERSTLE RIVER AREA, ALASKA

BIG DELTA (A–3) SW QUADRANGLE
SHEET NUMBER 2
7.5 MINUTE SERIES

This soil survey map was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1979–1980 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned. Digital soils data is available for this quadrangle.

1 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 0 1 KILOMETER

Scale 1:24000

Digital Data: UTM Coordinate System Zone: 6
Polyconic Projection
1927 North American Datum

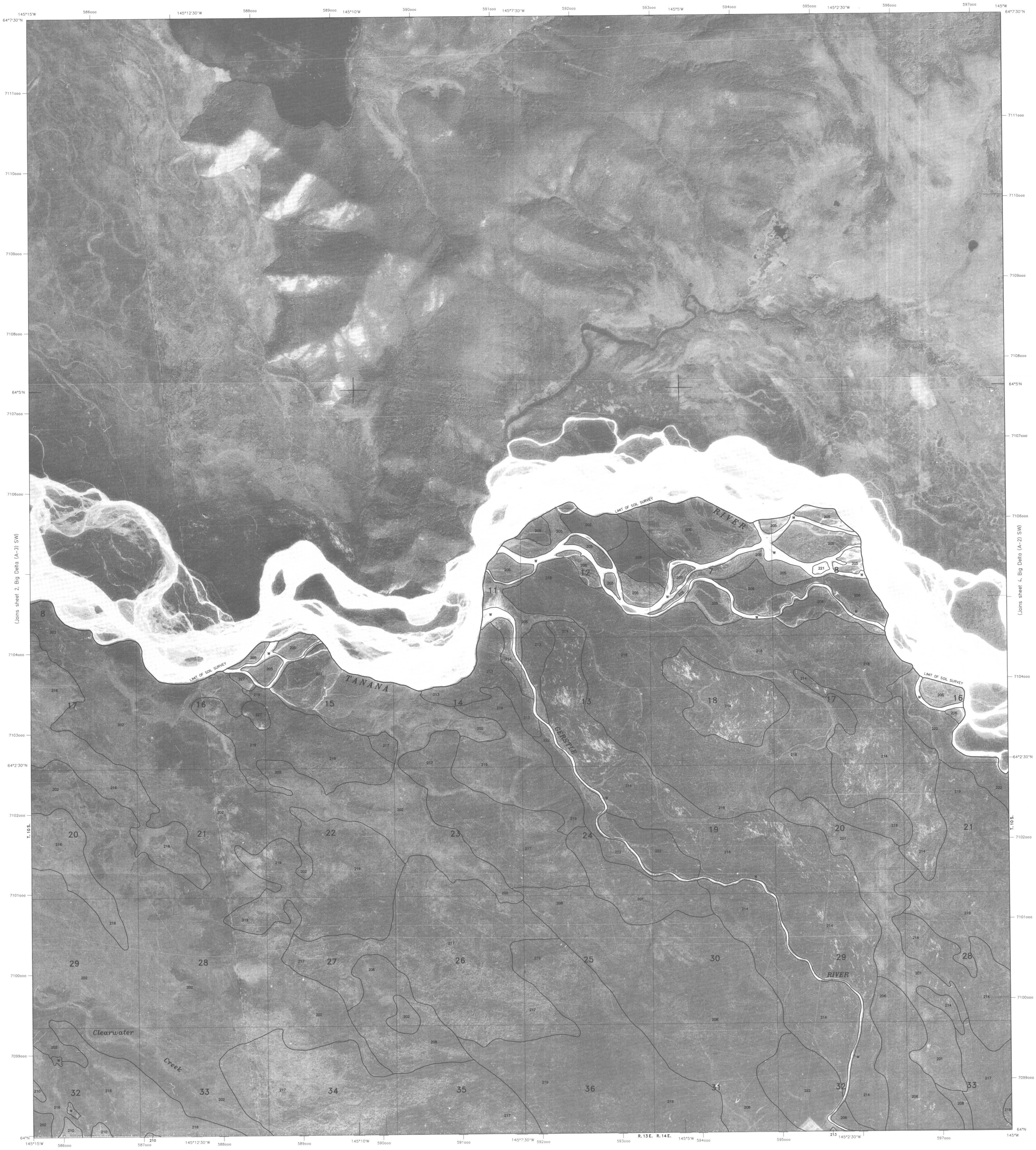
N

SHEET NUMBER 2 OF 10
GERSTLE RIVER AREA, ALASKA
BIG DELTA (A-3) SW QUADRANGLE

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

GERSTLE RIVER AREA, ALASKA

BIG DELTA (A–3) SE QUADRANGLE
SHEET NUMBER 3
7.5 MINUTE SERIES



This soil survey map was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1979–1980 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned. Digital soils data is available for this quadrangle.

1 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 0 1 KILOMETER

Scale 1:24000

Digital Data: UTM Coordinate System Zone: 6
Polyconic Projection
1927 North American Datum

N

SHEET NUMBER 3 OF 10
GERSTLE RIVER AREA, ALASKA
BIG DELTA (A-3) SE QUADRANGLE

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

GERSTLE RIVER AREA, ALASKA

BIG DELTA (A–2) SW QUADRANGLE
SHEET NUMBER 4
7.5 MINUTE SERIES

(Joins sheet 7, Mt. Hayes (D-2) NW)

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1 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 0 1 KILOMETER

Scale 1:24000

Digital Data: UTM Coordinate System Zone: 6
Polyconic Projection
1927 North American Datum

N

SHEET NUMBER 4 OF 10
GERSTLE RIVER AREA, ALASKA
BIG DELTA (A-2) SW QUADRANGLE

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

GERSTLE RIVER AREA, ALASKA

MT. HAYES (D–3) NW QUADRANGLE
SHEET NUMBER 5
7.5 MINUTE SERIES

(Joins sheet 2, Big Delta (A-3) SW)

This soil survey map was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1979–1980 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned. Digital soils data is available for this quadrangle.

1 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 0 1 KILOMETER

Scale 1:24000

Digital Data: UTM Coordinate System Zone: 6
Polyconic Projection
1927 North American Datum

N

SHEET NUMBER 5 OF 10
GERSTLE RIVER AREA, ALASKA
MT. HAYES (D-3) NW QUADRANGLE

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

GERSTLE RIVER AREA, ALASKA

MT. HAYES (D-3) NE QUADRANGLE
SHEET NUMBER 6
7.5 MINUTE SERIES

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1 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 0 1 KILOMETER

Scale 1:24000

Digital Data: UTM Coordinate System Zone: 6
Polyconic Projection
1927 North American Datum

N

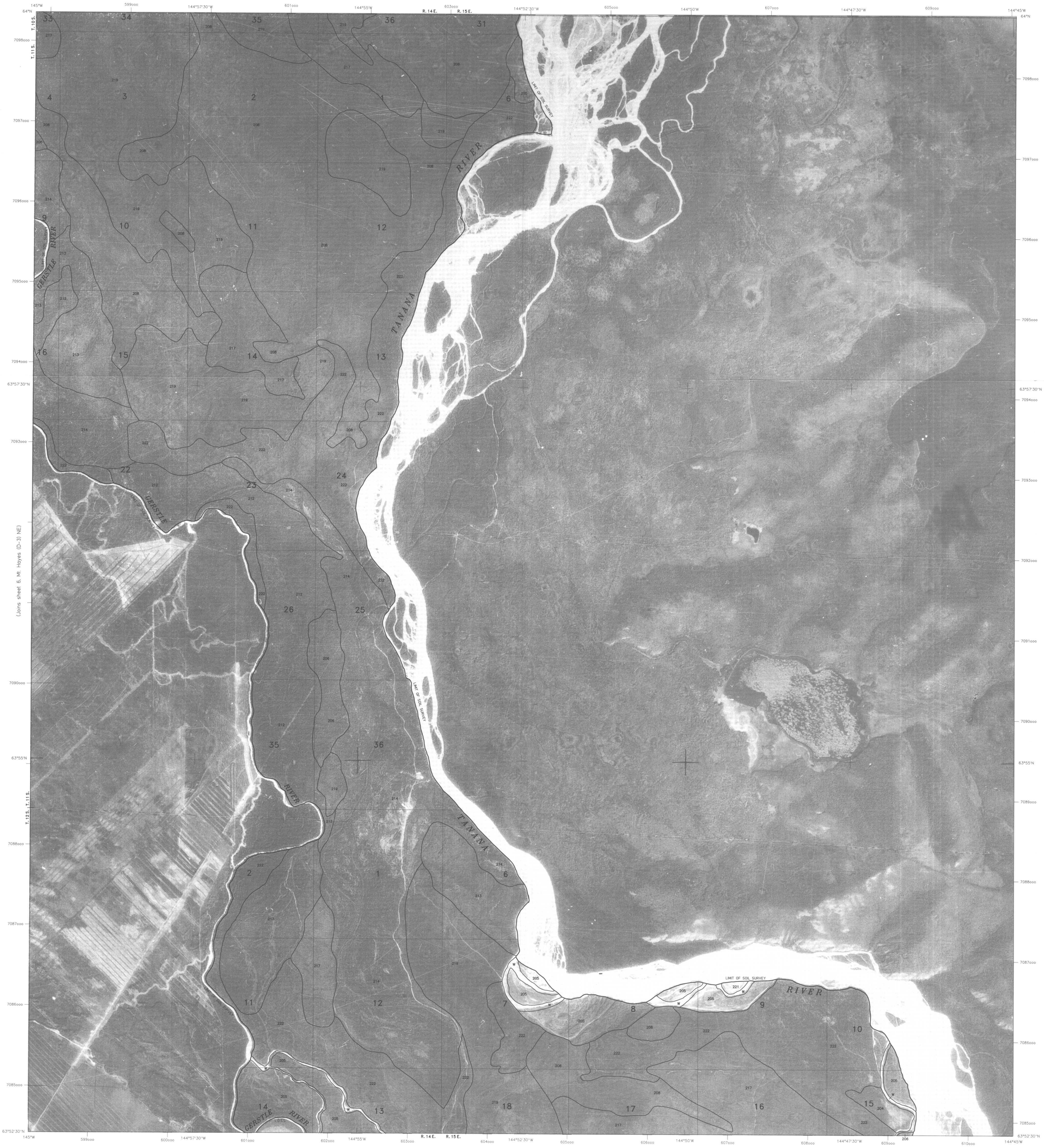
SHEET NUMBER 6 OF 10
GERSTLE RIVER AREA, ALASKA
MT. HAYES (D-3) NE QUADRANGLE

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

GERSTLE RIVER AREA, ALASKA

MT. HAYES (D–2) NW QUADRANGLE
SHEET NUMBER 7
7.5 MINUTE SERIES

(Joins sheet 4, Big Delta (A-2) SW)



(Joins sheet 6, Mt. Hayes (D-3) NE)

(Joins sheet 8, Mt. Hayes (D-2) SW)

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1 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 0 1 KILOMETER

Scale 1:24000

Digital Data: UTM Coordinate System Zone: 6
Polyconic Projection
1927 North American Datum

N

SHEET NUMBER 7 OF 10
GERSTLE RIVER AREA, ALASKA
MT. HAYES (D-2) NW QUADRANGLE

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

GERSTLE RIVER AREA, ALASKA

MT. HAYES (D-2) SW QUADRANGLE
SHEET NUMBER 8
7.5 MINUTE SERIES

Index sheet 7, Mt. Hayes (D-2) NW

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1 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 0 1 KILOMETER

Scale 1:24000

Digital Data: UTM Coordinate System Zone: 6
Polyconic Projection
1927 North American Datum

N

SHEET NUMBER 8 OF 10
GERSTLE RIVER AREA, ALASKA
MT. HAYES (D-2) SW QUADRANGLE

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

GERSTLE RIVER AREA, ALASKA

MT. HAYES (D–2) SE QUADRANGLE
SHEET NUMBER 9
7.5 MINUTE SERIES

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1 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 0 1 KILOMETER

Scale 1:24000

Digital Data: UTM Coordinate System Zone: 6
Polyconic Projection
1927 North American Datum

N

SHEET NUMBER 9 OF 10
GERSTLE RIVER AREA, ALASKA
MT. HAYES (D-2) SE QUADRANGLE

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

GERSTLE RIVER AREA, ALASKA

MT. HAYES (C-2) NE QUADRANGLE
SHEET NUMBER 10
7.5 MINUTE SERIES

(Joins: sheet 9, Mt. Hayes (D-2) SE)

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1 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 0 1 KILOMETER

Scale 1:24000

Digital Data: UTM Coordinate System Zone: 6
Polyconic Projection
1927 North American Datum

N

SHEET NUMBER 10 OF 10
GERSTLE RIVER AREA, ALASKA
MT. HAYES (C-2) NE QUADRANGLE